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Mariners Weather Log

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Front Cover: The loaded Spanish tanker CASTILLO DE BELLIVAR caught fire late on August 5. About 8 hr later she broke in two in waves reported to be up to 30 ft. Thirty-three people were rescued and 3 were missing. The stern sank on the 6th and the bow was towed to deeper water and sank on the 13th. Wide World Photo.

The Secretary of Commerce has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 1, 1985.

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Mariners Weather Log

SATELLITE INDICATORS OF RAPID CYCLOGENESIS

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On November 13 and 14, 1981, a weak surface LOW west of California deepened very rapidly. The 24 hr surface prognosis was off by approximately 50 mb.

GOES West satellite imagery, visible, infrared and water vapor, taken before and during the rapid deepening, gave clear indications that there would be relatively rapid cyclogenesis. The cloud patterns associated with this development show the importance of the "baroclinic leaf" pattern (Weldon (1977).

Sudden, rapidly developing, deep surface LOWs are potentially dangerous to mariners. On November 13, 1981, a weak LOW west of California deepened around 50 mb in 24 hr and moved rapidly toward the U.S. West Coast. The National Weather Service's computer prognostic package for this period did not catch the development and the 24 hr surface forecast for 0000 on the 14th was in error by approximately 50 mb.

Examination of the GOES satellite pictures taken before and during the early stages of deepening gave clues that there would be rapid cyclogenesis. The following pages, will show the synoptic situation and the satellite imagery that goes with the analyses, and will point out the distinctive cloud patterns that go with rapid cyclogenesis.

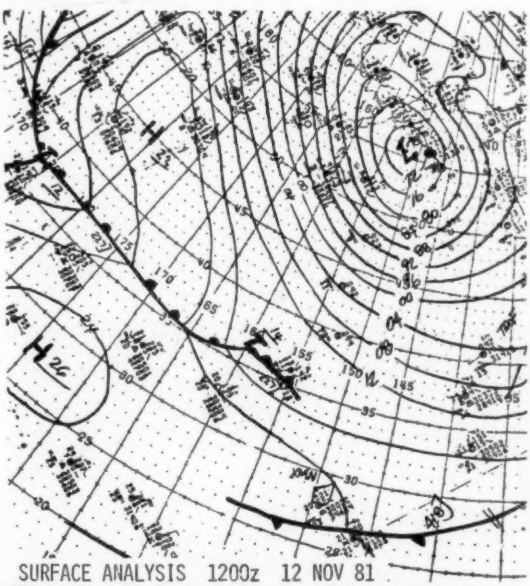

Figure 1.--Surface Analysis, 1200 November 12, 1981.

SYNOPTIC SITUATION AND SATELLITE IMAGERY

The synoptic situation at 1200 did not appear to pose the threat of a major storm off the west coast within the next 36 hr. There was a deep surface LOW near 55°N, 152°W, (fig. 1), with a weak wave near 36°N, 160°W, on an old frontal boundary. Aloft, at 250 mb, there was a very strong jet stream, (fig. 2), with winds as high

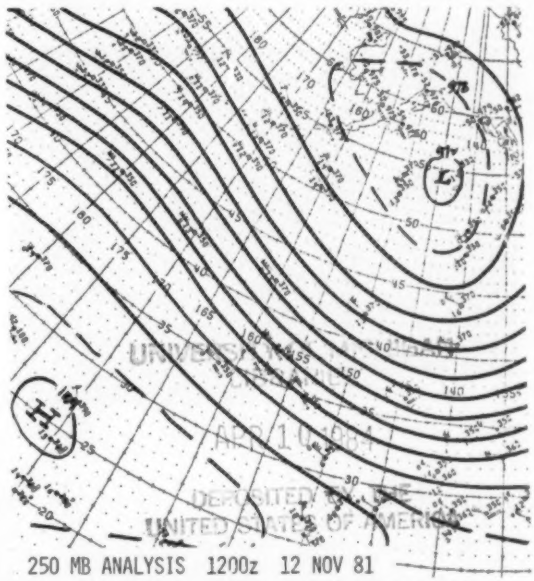

Figure 2.--250 mb Analysis, 1200 November 12, 1981.

Figure 3.--IR Image, 1345 November 12, 1981. Dashed Line 250-mb jet position.

as 160 kn near 42°N, 170°W. The strong flow aloft from the west-northwest had generally cyclonic curvature.

The GOES satellite infrared image for 1345, November 12, 1981 (fig. 3), shows an anticyclonic band of cold clouds from around 40°N, 170°W to 35°N, 145°W. This band of clouds has a sharp northern edge. The southern edge is somewhat ragged and apparently there is a deck of middle cloud south of the band from 160° to 170°W. The cold cloud band will gradually assume the shape of a leaf in subsequent images.

Although jet streams are frequently oriented parallel to cirrus bands, in the satellite signature for rapid cyclogenesis described here the northern edge of the high clouds is curved anticyclonically while the jet stream has cyclonic curvature.

The infrared image 4 hr later, 1745, November 12, 1981 (fig. 4), shows the area of high cloud increasing in width and beginning to assume a leaf shape between 37°N, 143°W and 38°N, 155°W.

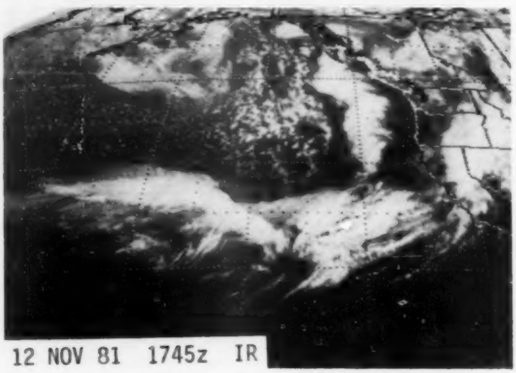

Figure 4.--IR Image, 1745 November 12, 1981.

Figure 5.--Baroclinic Leaf Model.

Figure 5 shows an idealized model of the "baroclinic leaf," (Weldon 1977). The "leaf" ideally has a sharp, well defined, northern edge with a somewhat more ragged southern edge. The formation is comprised of highly reflective cold clouds. The leading and trailing edges may be somewhat less well defined and may be warmer in

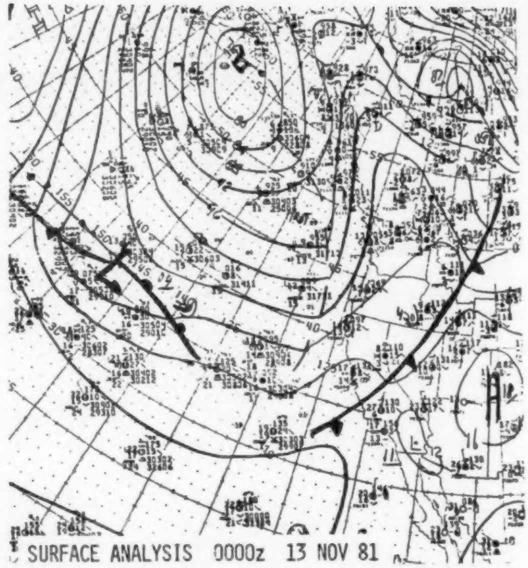

Figure 6.--Surface Analysis, 0000 November 13, 1981.

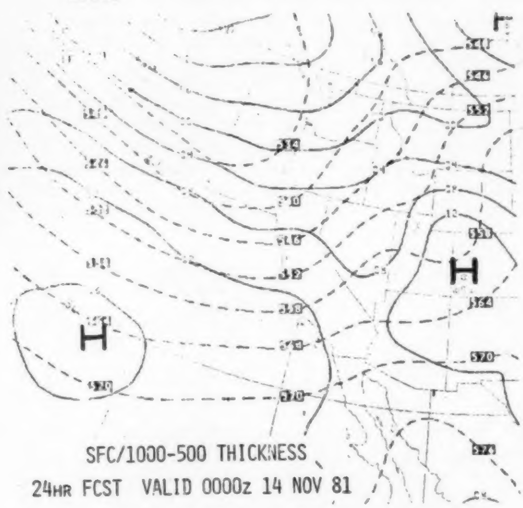

Figure 7.--24 Hr Surface Prognostic Chart for 0000 November 14, 1981.

the infrared imagery. A very important feature is that the upper-level jet axis passes over the rear portion of the leaf. When the leaf overtakes an existing frontal system, especially one with a wave on the front, rapid cyclogenesis often occurs. An excellent example of such rapid development is seen in the subsequent imagery shown here.

The weak surface wave seen in figure 1 has moved rapidly eastward and in figure 6 at 0000 November 13, 1981, is located near 37°N, 147°W. The surface pressure has dropped 10 mb and is now 1004. The deep surface LOW to the north has

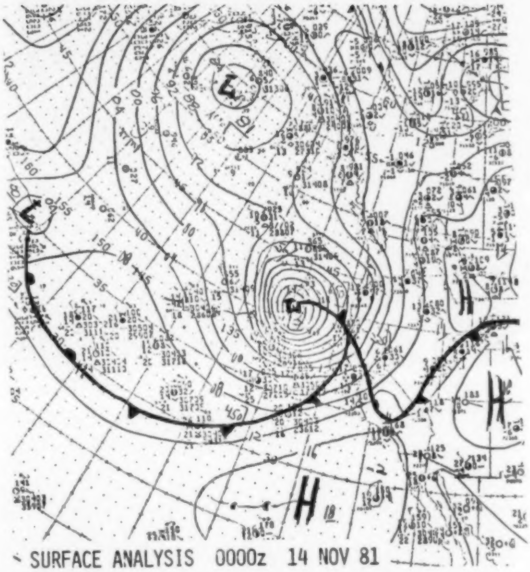

Figure 8.--Verification chart for figure 7, Surface Analysis for 0000 November 14, 1981.

Figure 9.--Visible image, 2145 November 12, 1981.

Figure 10.--IR image, 2115 November 12, 1981.

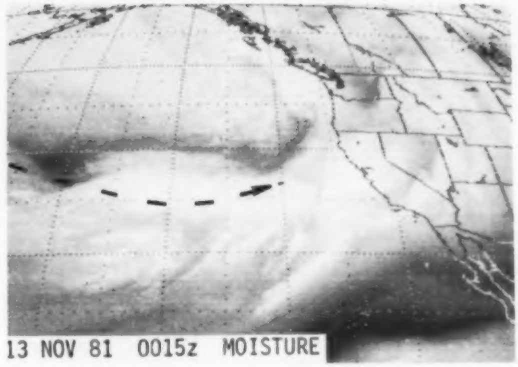

Figure 11.--Water Vapor Channel image, 0015 November 13, 1981. Dashed Line 250-mb jet position.

changed little in 12 hr. The large area of cyclonic surface flow extends all the way south to 25°N.

The 24 hr Limited Fine Mesh (LFM) surface prognostic chart from the National Meteorological Center (NMC) for 0000 November 14, 1981 (fig. 7) shows no sign of a LOW off the West Coast. The forecast surface pressure for the area of 40°N, 130°W is 1007 mb.

The verifying analysis at 0000 November 14, 1981 (fig. 8) shows a deep LOW with surface pressure near 956 mb. The development of a LOW this deep is not usually missed by the generally excellent NMC forecasts. However, over oceanic areas with no upper air data, systems can start to develop undetected by conventional data. The subsequent pictures will show that the satellite imagery did detect the development.

The visible image for 2145, November 12, 1981 (fig. 9) shows a bright leaf-shaped cloud area of thick clouds over the frontal wave and LOW. The infrared image for 2115 (fig. 10) again shows the baroclinic leaf to be a very cold area of thick multilayered clouds.

A new type of satellite image is shown in Figure 11. This is an image from the 6.7 micrometer moisture channel. Shown is the picture from 0015 November 13, 1981. This satellite sensor is most responsive to moisture in the 20,000 to 30,000 ft altitude range, (Anderson, Gurka and Steinmetz, 1982), but such images give a good indication of the synoptic-scale distribution of moisture. The lighter the shade in the image, the more high-level moisture is present. Again the baroclinic leaf shows up very clearly. Figure 12 is the IR image for 0045 on November 13, 1981. Note how the very bright areas on the moisture charts generally show up as bright areas (low temperatures) on the IR image. In Figure 12 the "leaf" has changed shape. It is now shorter and thicker and there are some indications of the northwest edge beginning to show an inflection point. The 0345 IR image (fig. 13) shows a radical change in the shape of the "baroclinic leaf." A band of clouds has begun to

Figure 12.--IR image, 0045 November 13, 1981. Dashed Line 250-mb jet position.

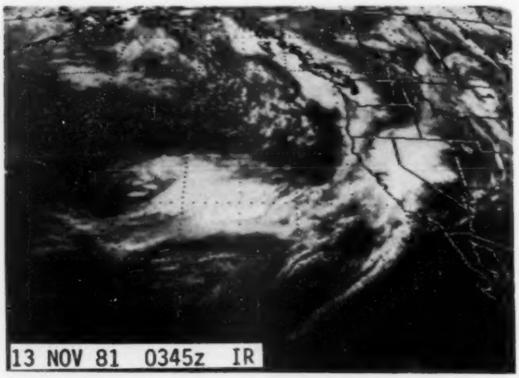

Figure 13.--IR image, 0345 November 13, 1981.

Figure 14.--IR image, 0715 November 13, 1981.

hook around to the northwest and the cloud mass is beginning to show a "comma" configuration. The rapid change from the "leaf" to "comma" configuration is characteristic of rapid cyclogenesis.

The 0715 IR image (fig. 14) shows continuation of the change in configuration from a leaf to a comma cloud formation. The rate of change here appears to have slowed somewhat. The bright hard edged clouds at "C" are cumulonibus. By 1145 (fig. 15) the IR image shows a well developed

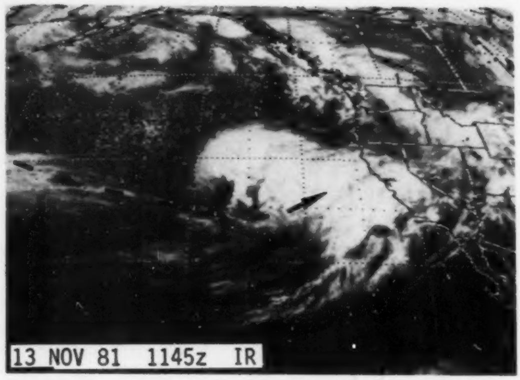

Figure 15.--IR image, 1145 November 13, 1981. Dashed Line 250-mb jet position.

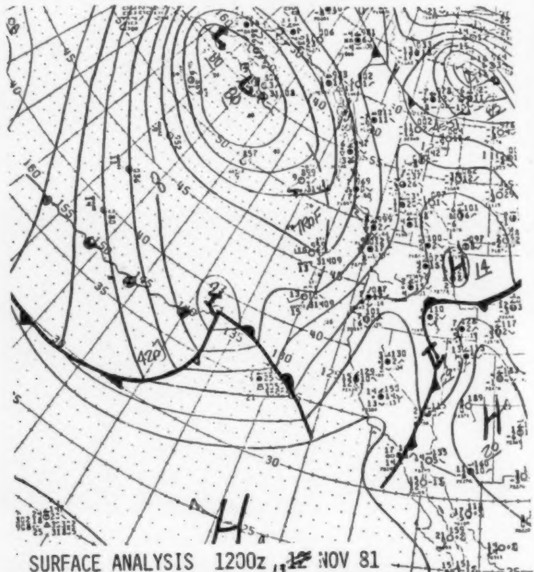

Figure 16.--Surface Analysis, 1200 November 13, 1981.

Figure 17.--Water Vapor Channel image, 1215 November 13, 1981. Dashed Line 250-mb jet position.

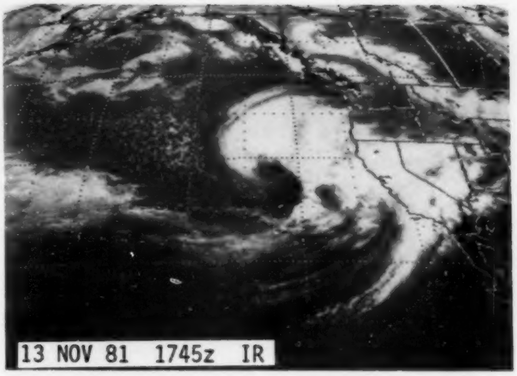

Figure 18.--IR image, 1745 November 13, 1981.

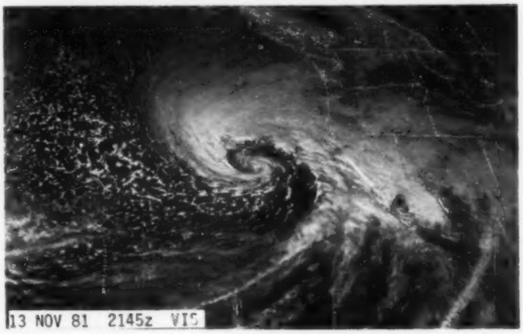

Figure 19.--Visible image, 2145 November 13, 1981.

comma. No trace of the "leaf" is left. The surface chart for 1200 (fig. 16) shows a 993 mb surface low at 39°N, 138°W. The LOW was most probably located from the satellite imagery as ship reports are sparse. It is quite likely, from the appearance of the well developed comma in figure 15, that the surface low is deeper than the analyzed value. A lower surface pressure would fit better with the pressure value 12 hr later. The moisture channel image for 1215 on the 13th (fig. 17) shows the comma cloud configuration with a dark area below the head of the comma. This indicates an area of dry sinking air, again an indication of rapid cyclogenesis. Six hours later, the IR image for 1745 (fig. 18) shows that the head of the comma has wrapped around in a spiral. This is an indication of a deep LOW. In the visible image for 2145 (fig. 19) there is a spiral band wrapping around the LOW center. This is characteristic of a tight circulation with strong winds close to the LOW's center. The surface analysis for 0000 November 14, 1981 (fig. 20) shows a 956-mb LOW at 41°N, 130°W. The moisture channel image (fig. 21) for 0015 on the 14th and the IR image (fig. 22) for 0045, show the spiral structure of the clouds around the LOW. The moisture image shows a pronounced dark area spiraling around the LOW, indication of subsidence and dry air. Both the IR and moisture images put the surface low center near 41°N 129°W, in excellent agreement with the conventional surface analysis.

SUMMARY

The 24 hr surface prognostic chart valid at 0000, November 14, 1981, (fig. 17) shows a sur-

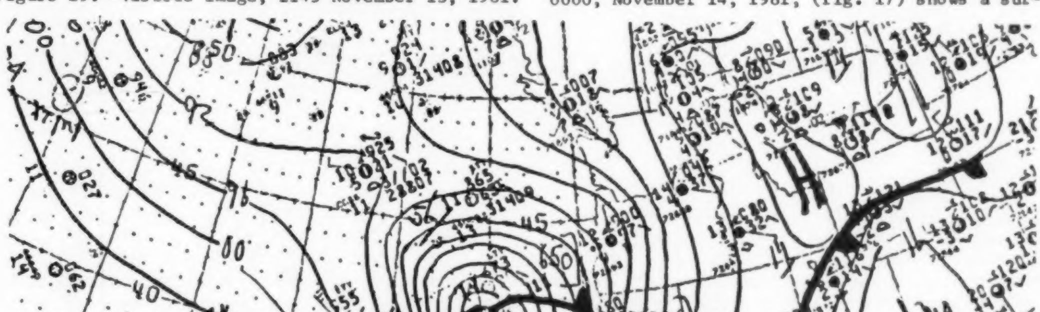

Figure 20.--Surface Analysis, 0000 November 14,1981.

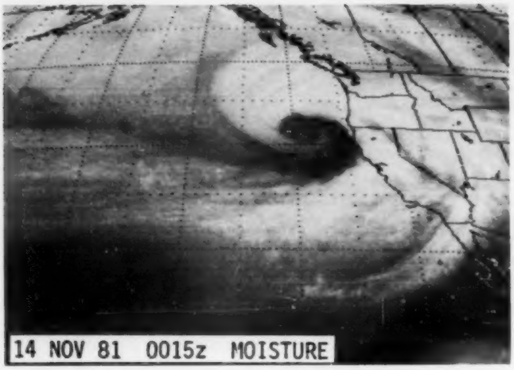

Figure 21.--Water Vapor Channel image, 0015 November 14, 1981.

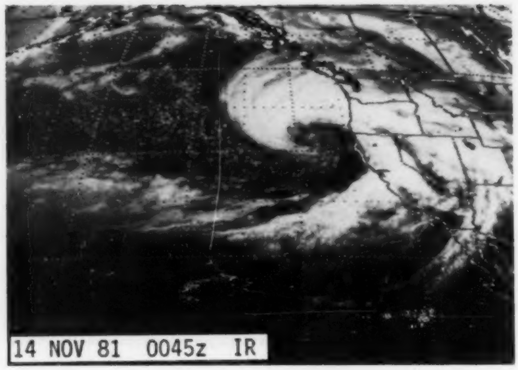

Figure 22.--IR image, 0045 November 14, 1981.

face pressure of 1006 mb at 41°N, 130°W. This was an error of 50 mb. Some reported winds exceeded hurricane force.

Examination of the satellite images late on the 12th and early on the 13th showed the "baroclinic leaf" and its evolution into a comma cloud. This is a reliable indicator that strong surface cyclogenesis is taking place. Thus, satellite images thus can be useful in evaluating prognostic charts. In this case the satellite images would have shown the strong possibility of rapid deepening of the surface LOW.

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Mariners Weather Log

WARM CORE CYCLONES IN THE MEDITERRANEAN

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Although most of the cyclogenesis occuring in the Mediterranean is primarily caused by the lee effect of mountains, I wish to call your attention to small cyclones looking strangely like tropical storms and developing from time to time over the Mediterranean Sea. In such cases, the main cause is not the lee effect but, in my opinion,the relatively high sea temperature and, more precisely the resulting strong convection.

On current synoptic maps, this kind of phenomenon too often passes unnoticed, owing to its limited horizontal size (about one geographical degree) and to the insufficient density of ship observations.

Fortunately we have at our disposal satellite pictures which are valuable instruments to detect these cyclones and to watch their movements. But, if we want to forecast them we must deal with serious difficulties as numerical models are, up to now, not prepared to cope with such phenomena. There is a problem of mesh size and also a problem of taking very precisely the convection and water evaporation into account.

I think the study of these depressions to be of double interest:

- o first, because the phenomenon leads to characteristic storms and heavy precipitation which are not to be neglected. However unusual they may be they must not be ignored. They deserve attention and their forecast must be improved.
- o then, they may be a valid means for testing the validity of fine mesh models and for fitting parameters.

Let us recall the main features of these cyclones:

- o first, a warm core with an "eye" of clear air surrounded with a circular wall of cumulonimbus.
- o second, a band of strong winds close to the eye.
- o third, the low-pressure system is deepest at sea level and fills gradually at upper levels.

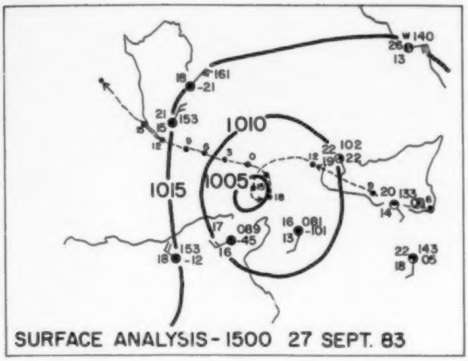

Figure 23.-- Surface analysis, 1500 September 27, 1983.

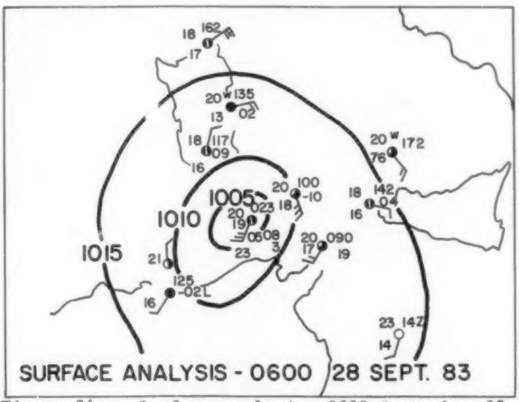

Figure 24.-- Surface analysis, 0600 September 28, 1983.

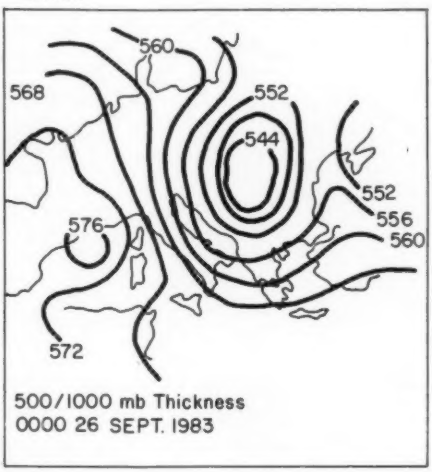

Figure 25.-- Thickness analysis, 500/1000 mb, 0000 September 26, 1983

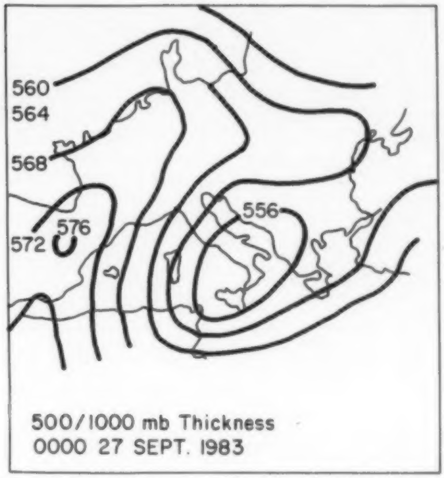

Figure 26.-- Thickness analysis, 500/1000 mb, 0000 September 27, 1983.

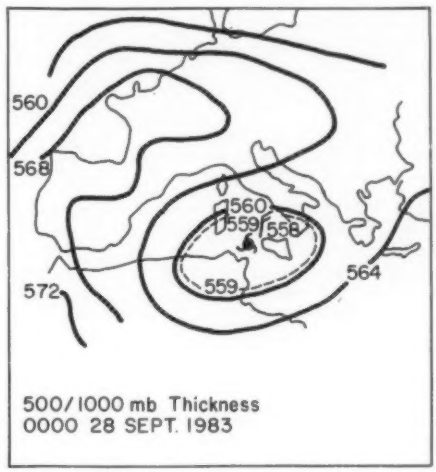

Figure 27.-- Thickness analysis, 500/1000 mb, 0000 September 28, 1983.

Recently, such a warm core cyclone circulated over the western Mediterranean. The phenomenon started on September 27, 1983 between Sicily and northern Tunisia (fig. 23) in connection with the arrival less than 24 hr earlier of cold air from central Europe. This cold air mass was directed to the southwest towards the very warm waters (23° to 25°C) of the Mediterranean by a very strong anticyclone developing over France (fig. 25 to 28). I remember that on the morning of the 26th, I said to the forecaster that a warm core cyclone could form within 2 days, with the probability of this event being around 20 percent in my opinion. The satellite picture at 1800 U.T. of September 27 showed a definite vortex 60 mi to the northeast of Tunis. Early

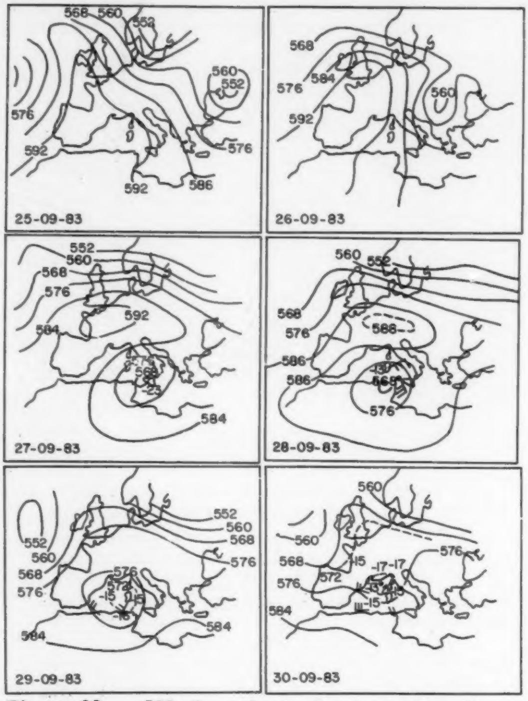

Figure 28.-- 500 mb analysis for September 25 through 30, 1983.

on the 28th, the satellite picture showed a well-formed eye surrounded with spiral bands of cumulonimbus. At 0600 (fig. 24), a ship located near the eye transmitted winds of 32 kn and, more significantly, waves of 4 meters. At 1200 hr the same day, the center which was moving west-northwestward at about 10 kn reached the extreme south coast of Sardinia, bringing a sustained southeast wind of 40 kn at Cagliari. After mid-night the track is no longer regular; some small loops are detected. The cyclone seems to hesitate but drifted northwestward. On the 29th, without the satellite, one could think it has vanished.

Early on the 30th it moved eastward, reaching Corsica before noon (fig. 29 and 30). At Ajaccio, southeast winds increased rapidly from 09 40 to a sustained speed of 41 kn at 10 40 (gusts of 57 kn) as the pressure fell 8 mb in 3 hr. At 1200 the eye was a few miles to the south of Ajaccio. Unfortunately, the radiosonde did not work so we do not know exactly the temperatures of the core. But, the thermal wind (parallel to the isotherms) was opposite to the wind; southeast 37 kn at 1,000 m, and southeast 25 kn at 2,500 m; which is significant of a warm core cyclone. At Pertusato gusts were recorded up to 84 kn.

After crossing Corsica, the cyclone died away in the Tyrrhenian sea. The relatively cold water (less than 19°C), visible on figure 31, must have contributed to its decay.

OTHER EXAMPLES

Last year I had the opportunity of pointing out some characteristics of these misleading LOWs.

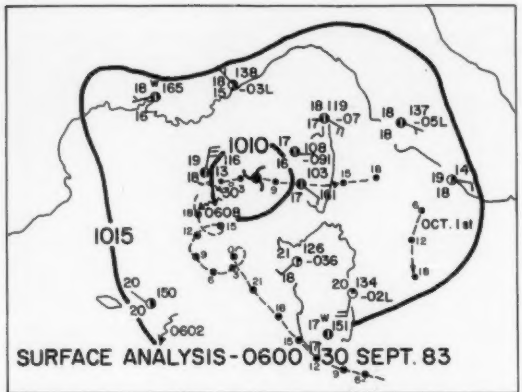

Figure 29.-- Surface analysis, 0600 September 30, 1983.

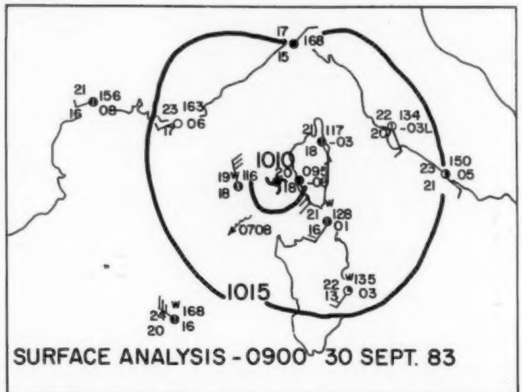

Figure 30.-- Surface analysis, 0900 September 30, 1983

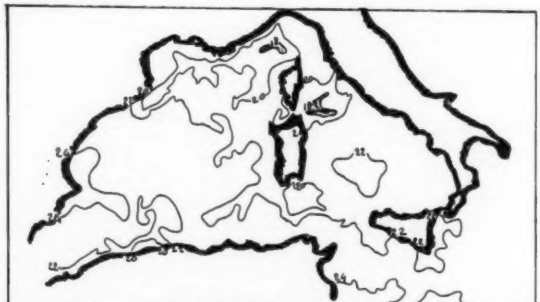

Figure 31.-- Sea-surface temperature September 30 to October 6, 1983.

Whereas they look like ordinary depressions, even seeming to fill, they keep much of their energy (mostly extracted from the sea) concentrated in the core where unadvised ships are surprised to suddenly meet with heavy showers and very bad visibility, storm winds and very rough seas.

Usually the maximum sustained wind speed does not exceed 50 kn or so at sea and 40 kn on land at coastal stations. But, sometimes such phe-nomena may result in limited violent storms up

to force 12, as happened along the French Coast on September 26, 1947.

In 1969, the famous warm-core cyclone of September 25 and 26 east of Tunis in the Gulf of Gabes does not seem to have been stronger than force 10. More recently, force 10 was again experienced in the cyclone of January 1982 in the central Mediterranean. Let us examine this interesting case.

"On January 26, 1982, the Center of Satellite Meteorology in Lannion provided information on an unusual depression in the Mediterranean presenting all the typical features of a tropical cyclone. The depression was located between Greece and Sicily near 37°N, and 19°E.

The sea-level pressure chart provided by the meteorological service center in Paris for that time and area indicated a mere, harmless depression seeming to fill. Two days earlier, on the 24th, this LOW was located near Malta with a pressure below 1000 mb, and its size was noticeably larger (compare 1010 isobars in figures 32 and 33). On the afternoon of the 26th we received the following Ship message: FNQX 26124 99372 10184 41496 80348 10116 20089 40008 57101 78022 687// 22222 00152 20408. It was transmitted at 1200 UT by the RO/RO freighter VILLE DE DUNKERQUE of the Societe Francaise des Transports Maritimes. As shown in the message, the ship's position was 37.2°N and 18.4°E, the wind was blowing from north-northeast at 48 kn and the pressure was 1000.8 mb, after a fall of 10.1 mb within 3 hr. Such a rapid fall of pressure is hardly ever seen in Mediterranean areas.

We were very lucky to get this interesting and valuable observation near the vortex located by the satellite (37°N, 19°E), for it confirmed a typical feature of tropical cyclones, namely: the strongest winds (here storm-force 10) at the rim of the eye.

The depression moved slowly eastward losing strength gradually. On January 28 at 1200 UT the depression reached the southern part of the island of Rhodes, lowering the barometric pressure there by the 4.7 mb in 3 hr." (After Summer 1983 issue of the Mariners Weather Log).

Warm core cyclones appear to develop even over cold ocean water as a result of occasional meeting of a warm air mass with a moving strong vortex. So, convection is not the only way for warm core cyclogenesis. But it is the main one over the Mediterranean Sea because of its high temperature, at least in late summer, autumn and winter.

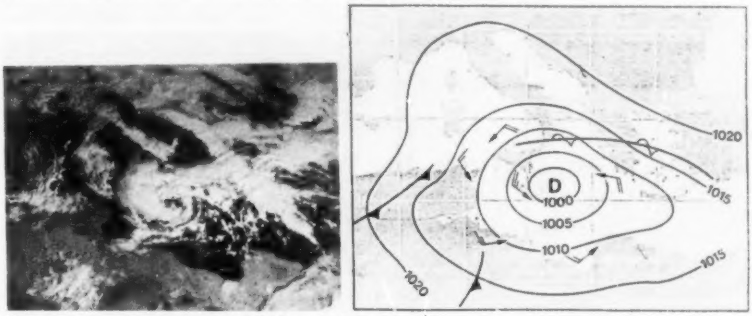

Figure 32.--Conditions on January 24, 1982 at 1200 with cloud configuration 3 hr earlier at 0900. It is worth noting that the depression was accompanied by very large cloud formations and is the center of an already well-developed large circulation on the photo from METEOSAT-2. Photo: Meteorologie Nationale-CMS Lannion.

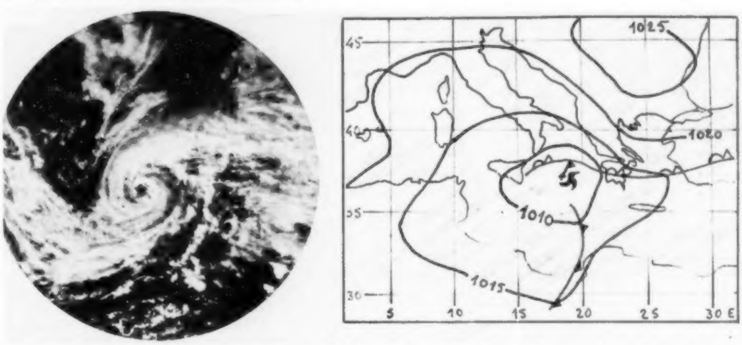

Figure 33.--Conditions on January 26, 1982 at 0600 with cloud configuration 6 hr later at 1200. The depression has shrunk noticeably. It has a good cyclonic pattern with a central eye, and powerful thunderstorms embedded in cloud spirals converging on the center as shown on this NOAA-7 satellite picture. The cross indicates the location of the ship experiencing storm winds. Photo: Meteorologie Nationale-CMS-Lannion.

Mariners Weather Log

NORTH ATLANTIC TROPICAL CYCLONES, 1983

Robert A. Case
and
Harold P. Gerrish
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Miami, Florida

The hurricane season of 1983, with a total of four named cyclones, was the least active season since 1930 (fig. 34). Three hurricanes and one tropical storm made the 1983 season minimal in many respects. The hurricanes that did occur were rather short lived. A total number of only five hurricane days made this season the least in number of hurricane days since 1931. For comparative purposes, the average number of hurricane days per season, based on a 30-yr period, is 26. This year became the first year since 1871 that no storms or hurricanes formed south of latitude 25°N. Finally, the 1982 and 1983 seasons became the first consecutive years since 1871 that no tropical storms or hurricanes formed in the Caribbean. A summary of the 1983 cyclone statistics are given in table 1, and past statistics in tables 2 and 3.

Fortunately for the shipping interests, the season was a minimal one in intensity as well as in activity. Hurricane Barry managed to attain minimal hurricane strength (maximum winds 70 kn) just prior to moving onshore along the northeast Mexican coast. Chantal intensified to minimal hurricane strength (65 kn) for about 24 hr prior to being engulfed by a fast moving disturbance in the mid-latitude flow pattern, and Dean (55 kn) was never more than a strong tropical storm. Hurricane Alicia was the only major hurricane of the season, and the ship that reported the highest wind gusts (110 kn) was the Coast Guard Cutter BUTTONWOOD, docked along the eastern end of Galveston Island.

HURRICANE ALICIA - AUGUST 15-21

Satellite pictures received on August 14 indicated that a cloud mass had begun to drift toward the southwest from the north central gulf coast. However, neither buoy data nor

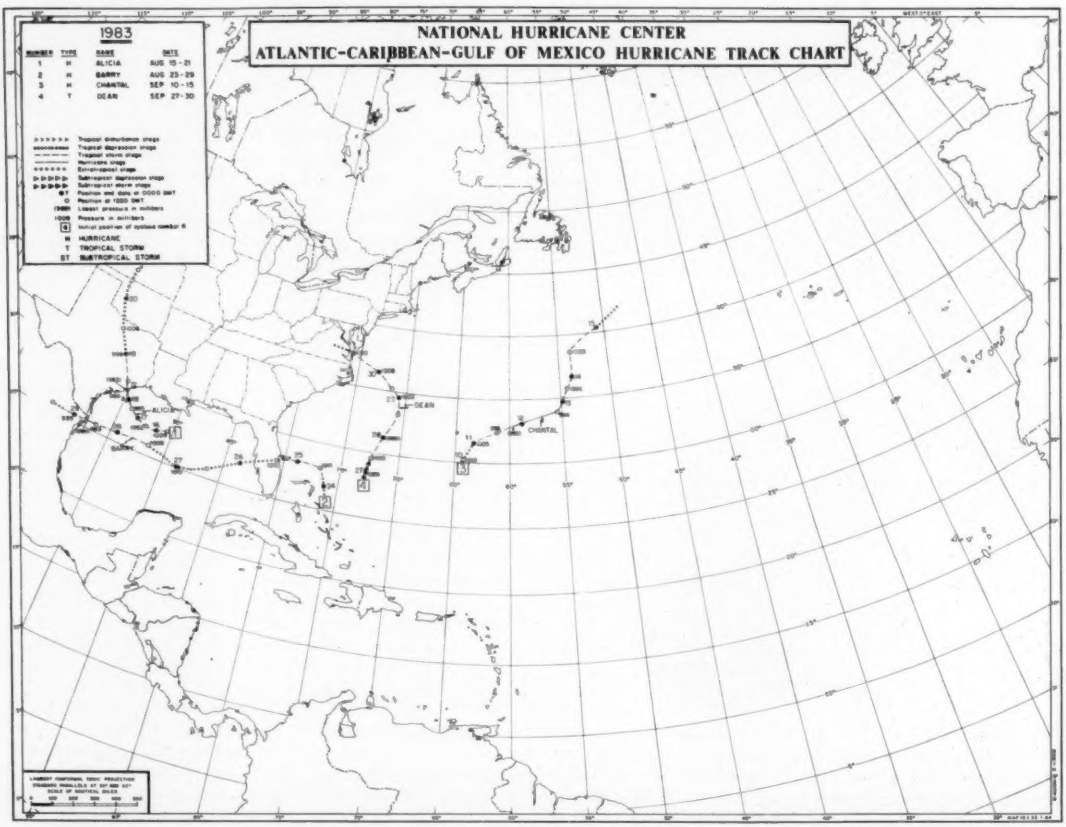


Figure 34.-- North Atlantic tropical cyclone tracks, 1983.

Table 1.-- Summary of North Atlantic tropical cyclone statistics, 1983

Cyclone Number	Name	Class	Dates	Maximum Sustained Winds (kn)	Lowest Pressure (mb)	U.S. $ Damage (millions)	Deaths
1	Alicia	H	15-21 AUG	100	962	100-200	21
2	Barry	H	23-29 AUG	70	986		1
3	Chantal	H	10-15 SEP	65	992		
4	Dean	T	27-30 SEP	55	999		

T = Tropical Storm (winds 34-63 kn)
H = Hurricane (winds 64 kn or higher)
ST = Subtropical storm (winds 34-63 kn)

Table 2
NORTH ATLANTIC TROPICAL CYCLONES FOR PAST YEARS

TOTAL NUMBER OF TROPICAL CYCLONES, LOSS OF LIFE AND DAMAGE

	Total Number Tropical Cyclones*		Total Number Hurricanes		Loss of Life		Damage by Categories**	
Year	All Areas	Reaching U.S. Coast	All Areas	Reaching U.S. Coast	Total All Areas	United States	Total All Areas	United States
1931	9	3	3	0		0		4
1932	11	3	6	2		0		4
1933	21	7	9	5		63		7
1934	11	5	6	2		17		6
1935	6	3	5	2		414		7
	58	21	28	12				
1936	16	7	7	3		9		6
1937	9	4	3	0		0		4
1938	8	4	3	2		600		8
1939	5	3	3	1		3		3
1940	8	3	4	2		51		6
	46	21	20	8				
1941	6	4	4	2		10		7
1942	10	2	4	2	17	8	7	7
1943	10	4	5	1	19	16	7	7
1944	11	4	7	3	1,076	64	8	8
1945	11	5	5	3	29	7	8	8
	48	20	25	11				
1946	6	4	3	1	5	0	7	7
1947	9	7	5	3	72	53	8	9
1948	9	4	6	3	24	3	7	7
1949	13	3	7	2	4	4	8	8
1950	13	4	11	3	27	19	7	7
	50	22	32	12				
1951	10	1	8	0	244	0	7	6
1952	7	2	6	1	16	3	6	6
1953	14	6	6	2	3	2	7	7
1954	11	4	8	3	720+	193	9	9
1955	12	5	9	3	1,518+	218	9	9
	54	18	37	9				
1956	8	2	4	1	76	21	8	7
1957	8	5	3	1	475	395	8	8
1958	10	1	7	0	49	2	7	7
1959	11	7	7	3	87	24	7	7
1960	7	5	4	2	185	65	8	8
	44	20	25	7				
1961	11	3	8	1	345	46	8	8
1962	5	1	3	0	4	4	6	6
1963	9	1	7	1	7,219+	11	9	7
1964	12	6	6	4	205	49	9	9
1965	6	2	4	1	76	75	9	9
	43	13	28	7				
1966	11	2	7	2	1,040	54	8	7
1967	8	2	6	1	68	18	8	8
1968	8	3	5	1	11	9	7	7
1969	18	3	12	2	384	256	9	9
1970	10	2	5	1	74	11	9	8
	55	13	35	7				
1971	13	5	6	3	44	8	8	8
1972	7	2	3	1	128	121	9	9
1973	8	1	4	0	16	5	7	7
1974	11	2	4	1	3,000+	1	8	8
1975	9	1	6	1	60	21	9	9
	48	12	28	6				
1976	10	4	6	1	77	9	8	8
1977	6	1	5	1	10	0	7	7
1978	12	2	5	0	41	36	7	7
1979	9	3	5	2	1,285	22	8	8
1980	11	2	9	1	236	2	8	8
	48	14	30	6				
1981	12	2	7	0	2	0	7	7
1982	6	2	2	0	26	3		7
1983	4	3		3	22	22	8	8
1984								
1985								
Total	516	191	295	97				
Mean	9.9	3.5	5.7	1.7				

**The Environmental Data Service has for some time recognized that, without detailed expert appraisal of damage, all figures published are merely approximations. Since errors in dollar estimates vary in proportion of the total damage, storms are placed in categories varying from 1 to 9 as follows:

1 Less than $50
2 $50 to $500
3 $500 to $5,000
4 $5,000 to $50,000
5 $50,000 to $500,000
6 $500,000 to $5,000,000
7 $5,000,000 to $50,000,000
8 $50,000,000 to $500,000,000
9 $500,000,000 to $5,000,000,000

* Including hurricanes and after 1967 subtropical cyclones
♦ Not reported in literature, believed minor.
+ Additional deaths for which figures are not available.

ship information could verify any closed circulation associated with the suspicious area. By 1800 August 15 the EXXON BOSTON (WHML) located about 75 mi southwest of the suspected center of circulation reported southwest winds of 25 kn with 6 ft seas and a surface pressure of 1016.0 mb. At approximately the same time, an Air Force reconnaissance plane found winds of 40 kn and an estimated central pressure of 1006 mb. Based upon this aircraft and ship information, the disturbance was named tropical storm Alicia late on the afternoon of August 15. Due to the abnormally high environmental pressures surrounding the storm, it generated winds stronger than usually observed in storms with similar minimum central pressures.

On the afternoon of the 16th (1900 GMT), the DB CHAMPION (located about 50 mi northwest of the storm center) reported winds from the east-northeast at 50 kn with gusts to 75 kn in squalls. During the next 24 hr, Alicia turned slowly toward the northwest and passed directly over the barge. Table 4 illustrates the excellent meteorological observations taken by the crew of the CHAMPION during this critical time period. The crew of the DB CHAMPION are to be commended for a job well done. Unfortunately, the tug JOEL ROBIN, out of Cameron, La., sank during the episode with the loss of one life while coming to the aid of the DB CHAMPION.

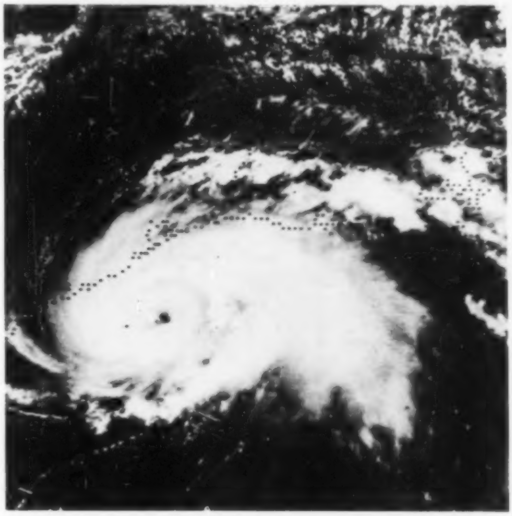


Figure 35.-- Hurricane Alicia is intensifying while approaching the Texas coast at 1731, August 17.

Hurricane Alicia continued to strengthen as it tracked toward the northwest on the remainder of the 17th. Figure 35 shows the well defined eye of the intensifying hurricane. During the pre-dawn hours of the 18th the center of Alicia (962 mb) moved onto the upper Texas coast a little more than 20 mi southwest of Galveston, Tex. Alicia became the first hurricane to strike the U.S. mainland since hurricane Allen hit the lower Texas coast in August of 1980.

HURRICANE BARRY - August 23-29

Barry was the season's only named tropical storm that began from an African disturbance. The disturbance became a depression just east of the northern Bahamas on the evening of August 23. At 0600 August 24, the OCEANIC (HOOE), located within 50 mi to the south of the suspected center, reported southwest winds of 20 kn with a central pressure of 1016 mb and seas of 9 ft. An unidentified ship located just to the north of the center at the same

Table 3
NORTH ATLANTIC TROPICAL CYCLONES FOR PAST YEARS

Frequency of Tropical Cyclones (Including Hurricanes) by Months and Years

		May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1931			1	1	2	3	1	1		9
1932		1			3	3	3	1		11
1933		1	1	3	7	5	3	1		21
1934		1	1	1	2	2	3	1		11
1935					3	1	2			6
1936			3	2	6	4	1			16
1937				1	2	6				9
1938					3	1	3	1		8
1939			1		1	1	2			5
1940		1			3	2	2			8
1941						4	2			6
1942					3	3	3	1		10
1943				1	2	4	3			10
1944				3	2	4	2			11
1945			1	1	4	3	2			11
1946			1	1	1	1	2			6
1947				1	2	3	3			9
1948		1		1	2	3	1	1		9
1949					3	7	2	1		13
1950					4	3	6			13
1951		1			3	4	2			10
1952	(Feb.) 1				2	2	2			7
1953		1			3	4	4	1	1	14
1954			1	1	2	4	1	1	1	11
1955				1	4	5	2			12
1956			1	1	1	4	1			8
1957			2		1	4	1			8
1958			1		4	4	1			10
1959		1	2	2	1	3	2			11
1960			1	2	1	3				7
1961				1		6	2	2		11
1962					2	2	1			5
1963				1	1	5	2			9
1964			1	1	4	4	1	1		12
1965			1		2	2	1			6
1966			1	4	1	4		1		11
1967					1	4	3			8
1968			3		1	3	1			8
1969				1	5	6	5	1		18
1970		1		1	3	3	2			10
1971				1	4	6	1	1		13
1972		1	1		2	2		1		7
1973				2	2	2	2			8
1974			1	1	4	4	1			11
1975			1	1	2	3	1		1	9
1976		1		1	5	2	1			10
1977					1	3	2			6
1978	(Jan) 1			1	4	3	3			12
1979			1	2	3	2	1			9
1980					3	5	1	2		
1981		1	1		2	5	1	1		11
1982			2		1	3				6
1983					2	2				4
1984										
1985										
Totals	(Jan) 1 (Feb) 1	12	30	41	132	181	94	20	3	515

Frequency of Tropical Cyclones Reaching Hurricane Intensity by Months and Years

	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1931					2				2
1932				3	1	1	1		6
1933		1	1	3	3	1			9
1934		1	1	1	1	1	1		6
1935				2	1	2			5
1936		1	1	3	2				7
1937					3				3
1938				2	1				3
1939				1		2			3
1940				3	1				4
1941					3	1			4
1942				3			1		4
1943			1	1	2	1			5
1944			2	1	3	1			7
1945		1		1	1	2			5
1946			1		1	1			3
1947				2	1	2			5
1948				1	3	1	1		6
1949				2	4	1			7
1950				4	3	4			11
1951	1			2	3	2			8
1952				2	2	2			6
1953				2	3	1			6
1954		1		2	3	1		1	8
1955				3	5	1			9
1956			1	1	1	1			4
1957		1			2				3
1958				3	3	1			7
1959		1	2		3	1			7
1960			1	1	2				4
1961			1		5	1	1		8
1962				1	1	1			3
1963			1	1	4	1			7
1964				2	3	1			6
1965				2	1	1			4
1966		1	3	1	1		1		7
1967				1	3	2			6
1968		2		1	1	1			5
1969				4	4	3	1		12
1970	1			1	1	2			5
1971				2	4				6
1972		1		1	1				3
1973			1	1	1	1			4
1974				2	2				4
1975			1	2	3				6
1976				4	1	1			6
1977				1	3	1			5
1978				2	2	1			5
1979			1	2	2				5
1980				3	3	1	2		9
1981				1	5	1	1		8
1982		1			1				2
1983				2	1				
1984									
1985									
Totals	2	12	19	82	116	48	10	1	296

time reported a pressure of 1017 mb, northeast winds of 20 kn and 5 ft seas. Thereafter, the depression quickly strengthened into tropical storm Barry.

On the 24th Air Force reconnaissance observations, satellite pictures and ship reports gave strong evidence to indicate that a surge of high pressure moving off the eastern coast of the United States had begun to turn Barry toward the west. At 1800 on the 24th, an unidentified ship (located within 50 mi west of Barry) reported north-northeast winds of 30 kn and a falling barometer. Elsewhere to the north all ships were showing strong pressure rises. In addition to the surface pressure surge from the north, strong upper level winds from the northeast forced most of the heaviest convection associated with Barry to the southern semi-circle of the storm (fig. 36), thus diminishing the storm's intensity.

Barry was downgraded to a depression as it crossed the Florida east coast just south of

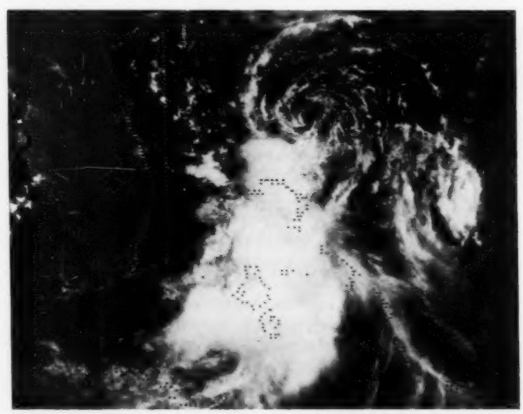


Figure 36.-- The low-level circulation of tropical storm Barry can be clearly seen north of the heavy deep convection at 1413 August 24.

Table 4.-- Ships encountering tropical cyclones in the North Atlantic during 1983

Vessel	Nationality	Date	Position of Ship Lat. Deg.	Position of Ship Long. Deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility N.Mi.	Present Weather Code	Pressure MB	Temperature °C Air	Temperature °C Sea	Sea Waves * Period Sec.	Sea Waves * Height Ft.	Swell Waves Dir. 10°	Swell Waves Period Sec.	Swell Waves Height Ft.
ALICIA																	
DB CHAMPION	NETHERLANDS	16	W CAMERON	BLK 655	19	07	50	2	63	1018.5	25				10	10	23
DB CHAMPION	NETHERLANDS	16	High Is.	A 393	21	06	50	1-2	63	1014.5	25				10	11	25
DB CHAMPION	NETHERLANDS	16	27.8	93.5	23	05	60	1/4	97	1011.6	25				09	11	25
DB CHAMPION	NETHERLANDS	17	27.7	93.6	00	04	50	1	81	1011.0	25				09	11	28
DB CHAMPION	NETHERLANDS	17	27.7	93.6	01	04	70	1/2	65	1009.8	25				06	11	33
DB CHAMPION	NETHERLANDS	17	27.7	93.7	02	04	80	1/5	65	1008.0	25					11	35
DB CHAMPION	NETHERLANDS	17	27.7	93.8	03	04	80	<1/10	65	1007.8					04		37
DB CHAMPION	NETHERLANDS	17	27.6	93.9	05	**		1									33
DB CHAMPION	NETHERLANDS	17	27.6	93.9	06	02**	30	2		1003.0							30
DB CHAMPION	NETHERLANDS	17	27.5	93.9	07	25	55	1		1000.8	26						33
DB CHAMPION	NETHERLANDS	17	27.5	94.0	08	27	60	< 1	65	1001.0	26				27		27
DB CHAMPION	NETHERLANDS	17	27.5	94.0	09	27	60	2	63	1004.8	26				27		27
TOYOTA MARU	JAPAN	17	27.2	96.0	12	02	75		13	1011.1			03	03	06	07	11
DB CHAMPION	NETHERLANDS	17	27.6	93.9	13	25	45	1	81	1008.0	27						20
DB CHAMPION	NETHERLANDS	17	27.6	93.6	17	20	45	1	81	1011.8	26						27
BARRY																	
(No Ships)																	
CHANTAL																	
(No Ships)																	
DEAN																	
GHWR	UNITED KINGDOM	27	32.2	74.4	12	02	40			1013.2			06	16	05	12	16
PETERSBURG	UNITED KINGDOM	27	31.2	74.7	12	22	40			1011.0			02	06	01	05	10
DRYSO	NORWAY	27	34.6	74.8	18	02	40			1014.5			07	10			
PETERSBURG	UNITED KINGDOM	27	30.3	74.6	18	03	35			1000.8			04	08	03	05	08
CARDIFF CITY	UNITED KINGDOM	28	36.0	73.8	12	03	35			1018.3			06	10			
OLEANDER	NETHERLANDS	28	36.1	70.0	18	05	35			1012.7			04	05	05	10	11
SAN PEDRO	UNITED KINGDOM	28	31.5	70.1	18	21	45			1007.2			04	11	24	06	16
C.G. Cutter TAMAROA	UNITED STATES	29	36.3	70.5	00	05	40			1001.0			03	08	05	05	18
VERGELEGEN	SOUTH AFRICA	29	37.3	68.5	00	04	40						05	03	05	08	18
SHIP		29	36.0	73.4	06	36	35			1016.6			07	06	04	04	19
VERGELEGEN	SOUTH AFRICA	29	37.2	66.6	06	12	35			1016.3			05	08	05	06	11
SHIP		29	36.5	70.3	06	05	40			1020.0							
SHIP		29	36.8	72.3	06	03	35			1001.7							
SHIP		29	34.2	75.5	06	32	40			1015.9							
BONAIRE	NETHERLANDS	29	33.7	74.7	09	03	40			1016.6							
SHIP		29	36.5	73.2	12	01	35			1014.5			05	11	02	07	29
CARMANIA	UNITED KINGDOM	29	38.4	73.9	18	04	40			1020.4			03	06	04	05	10
SHIP		29	37.0	72.6	18	04	55						06	06	04	08	28
CARMANIA	UNITED KINGDOM	29	38.7	73.3	21	05	40			1018.9			03	08	04	05	11
SHIP		29	37.3	72.2	21	03	40			1012.3			04	06	04	14	23
SHIP		29	33.5	74.3	21	04	35						03	06			
CARMANIA	UNITED KINGDOM	30	38.4	73.2	00	07	40			1017.9			03	08	05	06	13
SHIP		30	38.1	73.8	06	06	35			1012.5			09	13	36	09	16

* Direction for sea waves same as wind direction.
** Plain language report states ship in eye.

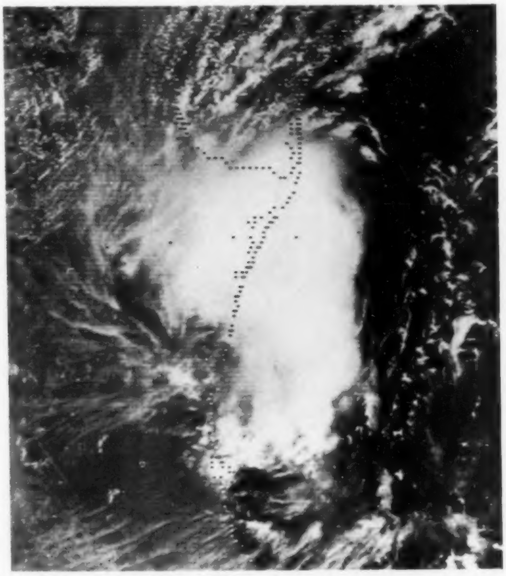


Figure 37.-- Hurricane Barry crossing the upper Mexican coast at 1700 August 28.

the Kennedy Space Center. Turning toward a west-southwest course, Barry moved under a more favorable upper-air pattern by the time it reached the central Gulf of Mexico, and once again attained tropical storm strength at 1200 on the 27th. Thereafter, Barry moved toward the west and strengthened to a minimal hurricane just prior to making landfall on the upper Mexican coast about 30 mi south of Brownsville (fig. 37). Damage from Barry was minimal in Florida and Texas. However, there was some structural damage and road washouts reported from Mexico.

HURRICANE CHANTAL - SEPTEMBER 10-15

Chantal began in a large envelope of low pressure centered a little over 100 mi south of Bermuda. On the morning of September 10, an Air Force reconnaissance plane found a closed circulation with sustained winds of 25 kn and 1010 mb pressure near latitude 30°N and longitude 64°W. During the afternoon and evening of the 10th, the intensifying depression moved toward the northeast with the center passing 100 mi to the southeast of Bermuda. Late on the afternoon of the 10th, reconnaissance aircraft found that the depression had deepened to 1006 mb with winds of 35 kn; therefore, it was upgraded to tropical storm Chantal.

No significant ship reports were available

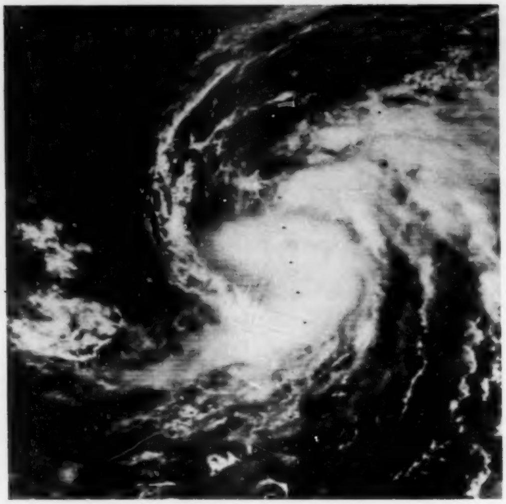


Figure 38.-- A faint eye was barely visible in Chantal's circulation beneath the cirrus overcast at 1701 September 11.

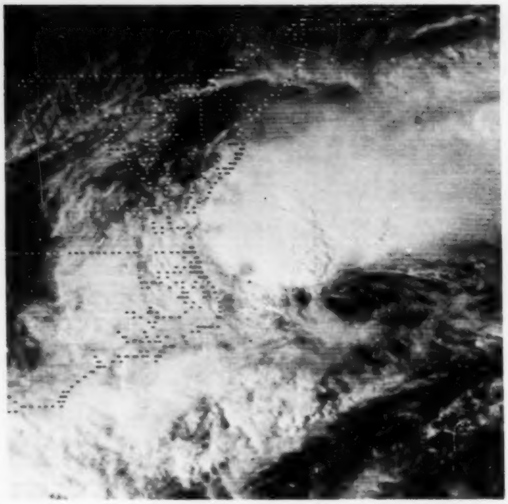


Figure 39.-- Tropical storm Dean was off the Virginia/North Carolina coast at 2001 September 29.

during the night of the 10th. Therefore, the first new information that supported the continued strengthening of Chantal was the final Air Force reconnaissance report on the morning of the 11th which showed winds of 55 kn and a central pressure of 996 mb. Based upon satellite data, (fig. 38), and since there were no ships close enough to the center of Chantal to be of help, Chantal was upgraded to a minimal hurricane on the afternoon of the 11th. Little change was detected in the hurricane during the following 24 hr (11/1800 - 12/1800). However, by the afternoon of the 12th, Chantal's deep convection became disorganized and it was downgraded to a tropical storm that evening.

A major trough in the westerlies moved to the northeastern U.S. coast on the 13th and Chantal turned toward the north. As the trough weakened and accelerated to the northeast during the following 24 hr, Chantal lost its identity and was engulfed by an associated surface weather front.

TROPICAL STORM DEAN - SEPTEMBER 27-30

Dean was a storm of subtropical origin that developed within a frontal cloud band which had moved off the U.S. east coast on September 22. During the next few days the front became stationary and extended from the Bahama Islands northeastward beyond Bermuda. At the same time, a large 1035 mb high-pressure center settled over the northeastern U.S. This combination of high pressure and the developing storm created a strong surface pressure gradient and produced northeasterly winds to near gale force along a large portion of the eastern seaboard.

By the 27th, Air Force reconnaissance found a surface pressure of 999 mb which was the lowest of the storm's existence. At the same time, satellite pictures indicated that the storm's cloud pattern and circulation were separating from the remainder of the frontal cloud band. Thereafter, Dean began to gradually weaken and, on the 29th, turned toward the northwest. Figure 39 shows the unorganized storm located just off the mid-Atlantic coast. Early on the 30th Dean moved onshore along the Virginia Eastern Shore and dissipated a few hours later.

During the time period 27/1200 to 30/0600, 23 ships within 300 mi of the storm reported winds of 34 kn or higher (table 4). Highest reported surface winds of 55 kn occurred on the 29th at 1800 by an unidentified ship located about 75 mi north-northeast of the center. With the multitude of ship reports, Air Force reconnaissance data, and satellite information, forecasters developed a great deal of confidence that Dean would turn toward the northwest and ultimately move inland along the mid-Atlantic coast.

Marine Observations Program

J. W. Nickerson
National Weather Service/NOAA
Silver Spring, Maryland

JACKSONVILLE, FLORIDA PORT METEOROLOGICAL OFFICER

Richard L. Rasmussen (fig. 40) has considerable U.S. Navy marine weather experience. He started his Navy career aboard the USS MIDWAY, an aircraft carrier, in 1961. From there he reported to the Fleet Weather Facility, San Diego, Calif. Then to Amphibious Group ONE Staff in the Philippines where he served on three vessels, the USS MT. MCKINLEY, USS EL DORADO, and the USS ESTES as an observer and upper air sounding and weather map analyst. Computer Maintenance School at Fleet Numerical Weather Center, Monterey, Calif. was followed by a tour at Pt. Pinos Research and Development Center in Pacific Grove, Calif. Then to Fleet Weather Central, Guam followed by Fleet Weather Facility, Naval Air Station, Jacksonville, Fla. where he was sent to "B" school in Lakehurst, N.J. and then back to Jacksonville as Duty Forecaster and Pilot Briefer. The last tour of duty in the Navy was aboard the USS MT. WHITNEY in charge of the weather office and as specialist in surf and swell forecasting for the Commander, Amphibious Group TWO. On April 11, 1977 Dick retired from the Navy and on June 5, 1977 joined the National Weather Service. He became the Port Meteorological Officer for the Port of Jacksonville in July, 1983.

Dick is married to the former Mary St. Johns of Monroe, Mich. Mary and Dick have three children and one grandchild.

Figure 40.-- Richard L. Rasmussen, Jacksonville, FL Port Meteorological Officer.

EXTREME STORM WAVE CASUALTY

The RENAICO was struck by a "gigantic" wave 200 mi north of Cristobal, Republic of Panama. The force of the wave damaged the port side, hurled nine containers overboard, and brought the ship to the point of capsizing with a 40-degree roll. The vessel was on passage from Houston to Cristobal with 7,200 tons of general cargo when struck by the wave at 2130 LZT, August 25, 1983.

We are investigating the weather and oceanographic conditions in the area at that time and will report the incident in greater detail in a later issue. In the meantime, we would like to have a report of conditions from any ship in the southwestern Caribbean around that time.

MARINER SCHOOLS

As some of you know, I teach a class in marine weather at the Maritime Institute of Technology and Graduate Studies (MITAGS). Actually, I learn as much as I teach and I would like to share some of my notes with you.

OBSERVERS HANDBOOK NWSOH NO. 1

Everyone seems pleased with the manual layout, the page tabs for quick reference to the observation groups, etc. This may have made it so easy to look things up that the handbook is not being read through carefully at least once. Most of the questions asked at MITAGS are in the NWSOH NO. 1.

Why Does the Mariner Make Weather Observations?

- "Because the company (master) told me to do it."
- "Because NWS asked us to make observations."
- "To help other ships."
- "To improve weather forecasts."

We usually have 6 to 10 answers like this. Good answers, but the fundamental reasons are:

- Ship or Personal Safety
  Everyone realizes that accurate weather forecasts make it safer for their ship. Observations make the forecasts better; therefore, making observations increases the possibility of a safe passage.
- Personal Profit
  If a ship and its cargo are damaged, this costs the company or the owners money. If the damage is significant the ship may be laid up, sold, or scrapped. The crew is then laid off, fired, or transferred. The mariner's pay check is his/her personal profit and it can be affected by weather.

  Making observations does not guarantee good weather, but observations do improve forecasts. Weather forecasts are tools for making decisions, without them the mariners are operating with a definite handicap.

How Can One Ship Make Any Difference?

With no observations in a large ocean area the forecaster and the computer guidance products that the forecaster uses have only climatology as a base. If one ship, traveling through this ocean area, makes an observation the weather report is used instead of the climatological data.

The report is used at full value at the time of the observation and at a continually decreasing value as time passes, spreading in all directions like the waves from a pebble dropped in a pond. If the ship continues to make weather reports every 6 hr, the effect of their earlier reports will combine with the current report and the effect of one, single ship on the weather forecast will increase with each weather report.

Mariners Weather Log

Paraphrasing a little, "I never saw a Mariner's Weather Log I didn't like." As reported, the problem is getting one to read. We distribute one copy to each ship in the Voluntary Observing Ship Program as a training aid with the intent that the master, mates, and radio officer see it before it gets "lost." It is important that they see each issue as quickly as possible. If you can't bear to part with an issue, please use the subscription form on the back and then you will have your own private copy.

Misunderstandings and Mistakes in Observations

- o The barometer should be read exactly on the hour for the observation.
- o The wind should be averaged in speed and direction over a 10 min period. If there is a wind shift during the period, average the wind after the shift.
- o Wind waves have lulls, or periods of low waves, and peak waves, where one or more waves are higher than normal waves. The observed wave height and period should be the average of the well-formed waves that are neither the lull or peak type.
- o Measurement of wave height can be accurate if you use something to check the height at a distance from the ship, i.e. the width of a finger at arm's length. Caution: the angle of observation must remain constant. For instance, at about 30° down from the horizon at about 200 yards out from the ship, my little finger at arm's length measures the height of a wave a bit over 10 feet high. Select similar check points for yourself when you are in port and there are plenty of objects about at known heights.
- o Wave period is the average of the time between wave crests passing a bit of flotsam for the same type waves as you measured the height. Guessing is not good enough and may foul up the data. Many quartz wristwatches have stop-watch timers. Push the timer and start counting the number of times a piece of flotsam or foam goes over the crest of the waves. At ten or twenty waves stop the timer. Convert the minutes to seconds. Divide the total seconds by the number of waves. By using 10 waves finding the wave period is done by simply moving the decimal point one space to the left, i.e. 59 sec - 10 waves = 5.9 seconds period. Round to 6 seconds and record PwPw as 06. Measure the period in this manner for 3 periods. The values should be quite close. If they are not, take another set of measurements and drop the set that doesn't fit. If the sea is calm and there are not wind waves, record and report 20000 for the group 2PwPwHwHw.
- o Swell should be a distinct set of waves which, compared to wind or sea waves of similar height, are more uniform, have longer crests and periods, and are usually not as steep. They can be more easily distinguished from wind waves if they come from a different direction. However, they could be coming from nearly the same direction as the wind wave, but be identifiably by their other features. If there are no swell, for the swell group enter 30000 and omit the 4 and 5 groups.
- o Sea surface temperature (SST) is a very important measurement for merchant ships to locate currents and, of course, for fishermen. The dip or sea water thermometer is the most accurate way to measure SST, but it's often inconvenient or impractical to use underway from high-sided ships. The dip can and should be used to calibrate the induction manifold thermometer when anchored out or when slowed under low wind conditions. After the induction thermometer is thus calibrated, it will be accurate under those particular conditions. Until the induction thermometer's calibration is complete for all usual conditions, dip and indicator temperature measurements should be recorded. The induction temperature should be corrected to the surface temperature. This correction may be applied under similar conditions.

Ships Weather Observations, NOAA Form 72-1A

There have been steady improvements, keep up the good work.

- o General Instructions - "1. Print all entries using black ballpoint pen." We look at this as a requirement and will be furnishing ballpoint pens with reproduction ink in the near future. Most mariners don't realize that this form is photocopied for use by ships, engineers, lawyers, judges, universities, and commercial research companies, to name a few users. Your ship was designed based on the data from these records. This should either make you proud or scare you depending upon how carefully you have made and recorded weather observations.
- o Heading "Name of ship," etc. must be completed on each form.
- o "Principal Observer" is the ship's weather observations focal point. He usually handles the supplies, mailing the completed forms, etc. PMO's try to contact him on PMO ship visits, or write him to discuss observation problems.
- o Time, GG. The small numbers are reminders of the synoptic times. Cross out the preprinted number and add the correct time

(hour) of the observation.

- o Observations for the record. Ships may record some or all of the observation groups every hour if desired. Some masters like to know what the weather had been doing since the last time they were on the bridge. The forms may also be copied for company records.
- o Column No. 9, "Weather Data Indicator." This indicates if the 7 group, weather, is to be transmitted. Please read the last paragraph of page 2-77, NWSOH No. 1.
- o Shaded entries are not entered on 72-4A. In the first, the true wind calulations, only the "Estimated" box is checked if the wind is estimated from the look of the sea. The shaded columns are used for logging the basic data for calculating true wind from an anemometer. There is no need to work back from an estimated wind just to fill in the columns.
- o Any group with a "group indicator" number may be omitted if that element cannot be observed or there isn't anything to report.
- o Total Cloud Amount, N, column 16 of the 72-1A, should support the cloud group 8. If N is 0, group 8 should be omitted on both forms 72-1A and 72-4A.
- o Do not use four ////'s in any group, omit the group entirely if there is nothing to report and it has a group indicator number.
- o In the "REMARKS" section of the 72-1A please indicate when the wicking is changed on the wet-bulb thermometers of the sling psychrometer. It should be changed any time it gets dirty or it becomes contaminated by salt water. Your entry that the wicking was changed on the wet bulb adds confidence to this measurement.
- o On the back of the 72-1A, left side, there is an address block. If only one form is submitted this should be filled out. If two or more are submitted only one address block need be completed. This allows the PMO to verify his records, and make any changes required.
- o Supplies needed are checked, as necessary, to let PMO know you are running low on a particular item.
- o Weather Forecast Evaluation. Use this space freely for comments or suggestions as well as forecast evaluation.
- o Freak Wave Report, now called Extreme Storm Waves, is a very important report. Make use of the space above for any additional comments.

Weather Report for Immediate Radio Transmission, NOAA Form 72-4A

- o The observer should complete the lower part of the form including STORM or SPREP, if applicable (NWSOH No. 1, pages 1-9 and 1-10), and the ship's CALL SIGN.
- o Coordinate with the radio officer to get the weather reports transmitted. If agreeable, all synoptic observations should be written up and sent to the radio room so that the R.O. can get them out when he goes back on watch. A nighttime observation a few hours late is better than none at all. To match the radio officer's watch hours an observation can be sent an hour early, or an hour late, or as a three hourly, or intermediate synoptic observation.

Facsimile Weather Information

Facsimile receivers, which reproduce weather maps and forecasts aboard ship, are becoming increasingly popular as a method for getting pictorial weather information. By plotting the ship's position on the facsimile map it is easy to see the type of weather approaching the ship and plan according. The cost of the receivers is small and with the ever increasing variety of products available over it, radiofax is becoming an increasingly important part of the ship's equipment.

The Coast Guard is testing a directional antenna for their radiofax at Point Reyes, Ca. Great improvement has been reported, particularly in the Southeastern Pacific. New Orleans, radiofax, WLO provides data over the Gulf of Mexico. Ice information is already being broadcast out of Boston, NIK (See Ice Patrol article). This service is scheduled to be expanded to include weather information in early 1984. A new radiofax broadcast is being developed in cooperation with the University of Delaware. This is all in addition to the Navy radiofax broadcasts from Norfolk, Va, Hawaii, and Guam.

Data Needed

All of the forecasts, including radiofax, depend upon ship weather observations for weather data. These observations become increasingly important near the coast where storm systems frequently originate or strengthen. We need observations as close to the coast as the ship goes, even into the bays, in order to pick up the signs of early development.

NOAA Weather Radio (NWR)

A few at MITAGS did not know about NWR which broadcasts weather forecasts continuously. Those stations shown on pages 1-18 through 1-21, NWSOH No. 1, also broadcast harbor and coastal weather. I recently saw this sign on the bridge of a ship, "Open no hatch covers unless NWR is on." Good advice.

Tips to the Radio Officer

NEW COAST GUARD RADIO SERVICE FOR MARINERS

The Coast Guard is now broadcasting from it's station at Sandwich, Mass., navigational and weather information using a new radio format taking advantage of the low cost microcomputer. This service, called the Navtex system, is already extensively used in Northern Europe. Navtex stands for Navigational Telex.

Starting at 0500 GMT and repeated everv 6 hr thereafter, a broadcast is made on 518 kHz which includes navigational notices to mariners, weather forecasts, weather warnings, and search and rescue alerts. A "smart" radio receiver installed in the pilot house of a ship checks each message to see if it has been received during an earlier transmission, or if it is of a category of no interest to the ship's master. If it is a new and wanted message, it is printed on a roll of adding-machine size paper. Previously, a radio operator had to be at the radio at the right time to listen to a voice broadcast or decode a Morse coded broadcast to obtain this information. With the Navtex system, he can walk over to the radio at any time, and read only the messages of interest to him. A new ship coming into the area will receive previously broadcast messages for the first time; ships already in the area which had already received the message won't receive it again.

Ships within 200 to 300 miles of the Sandwich transmitter will be able to receive these broadcasts (this includes the whole New England Coast, as well as the Georges Bank fishing area).

At least three manufacturers already offer Navtex receivers, which cost from slightly over \$2,000 to under \$1,000.

Navtex has the potential to provide an improved standard of navigational information to the mariner with less work on the part of the ship's staff. The system has been so successful in Europe that the International Maritime Organization, a UN agency specializing in maritime affairs, is considering requiring Navtex receivers to be installed on all vessels 300 gwt and upwards.

A second Navtex broadcast will start up at New Orleans in early 1984.

CLOSING CW AT NAVCOMMSTA NEA

As of January 15, 1984 the U.S. Navy discontinued all CW ship/shore services at station NGR Naval Communications Station (NAVCOMMSTA) NEA Makri, Greece. This was announced in MARAD advisory 84-2.

FACSIMILE TEST

The Naval Eastern Oceanography Center at Norfolk, VA announced they would be transmitting a test facsimile chart. They request that mariners copy the test chart and forward it with comments, position of reception, etc. The time of transmission will be indicated in the Monday schedule transmission. See last item of The Editors Desk.

The Editor's Desk

SOLAS, CHAPTER III

The Maritime Safety Committee of the International Maritime Organization recently approved a complete revision of Chapter III of the Safety of Life at Sea Convention, "Lifesaving Appliances and Arrangements." The new requirements for lifesaving equipment, scheduled to go into effect for new ships on July 1, 1986, and for existing ships on July 1, 1991, reflect recent advances in survival technology.

The major changes concern: Emergency position - indicating radio beacons (EPIRBs), Two-way radiotelephone apparatus, Exposure suits, Lifeboats, Liferafts, Launching capability, and Training and maintenance.

A detailed article can be found in the January 1984 issue of Proceedings of the Marine Safety Council.

1984 INTERNATIONAL ICE PATROL

In February or March, 1984, depending on iceberg conditions the International Ice Patrol will commence its annual service of guarding the southeastern, southern, and southwestern limits of the regions of icebergs in the vicinity of the Grand Banks of Newfoundland. Reports of ice in this area will originate from ships and flights by Ice Patrol Aircraft. Twice each day, the Ice Patrol will broadcast a bulletin and a daily radiofacsimile chart containing ice information to inform ships of the extent of this dangerous region.

Report ice sightings, weather, and sea-surface temperature to Commander, International Ice Patrol - COMINTICEPAT GROTON, CT through U.S. Coast Guard Communication Stations or Canadian Coast Guard Radio Station St. John's/VON.

For additional information see the February 1984 issue of Proceedings of the Marine Safety Council from which this was extracted.

COMPARING PAST 10 WINTERS

If everything else is moving at a faster pace nowadays, it may as well happen to the weather too.

Meteorologist Tom Karl of NOAA recently dug into the records and found that the nation as a whole has seen more than its share of extreme winters over the past decade.

"Extreme" winter means exactly that in Karl's terminology: a winter that is much colder than normal or one that is much warmer than normal.

On average, each decade has slightly more than one winter which falls into the "much below normal" category and likewise for the

Winter	North-East	East North Central	Central	South-East	West North Central	South	South-West	North-West	West	National
1982-83	++	++	++	0	++	0	+	+	+	++
1981-82	-	--	--	-	-	-	+	-	+	-
1980-81	-	+	-	-	++	+	++*	++	++*	++
1979-80	0	+	-	-	+	-	+	+	++	+
1978-79	-	--	--	-	--*	--	--	--	--	--*
1977-78	--	--	--*	--*	--	--*	+	++	++	--
1976-77	--	--	--	--	+	--	0	0	0	--
1975-76	0	+	+	0	++	+	0	+	+	++
1974-75	+	+	+	+	0	0	-	0	-	0
1973-74	+	-	+	+	+	0	-	0	0	0

++ Much above normal, + Above normal, 0 Normal, - Below normal, -- Much below normal
* COLDEST OR WARMEST OF CENTURY

"much above normal" category. But not the late 1970s and early '80s.

"When the temperature is averaged across the contiguous 48 states," said Karl, who is with the National Climate Data Center in Asheville, N.C., "we find that there have been three winters with much below normal temperatures and three that were much above normal in the past decade."

The probability theory can be used to answer the question, How unusual was this many extreme winters in a decade? If the winter climate is not changing, then the number of observed extreme winters (6) in the past decade (1973-74 to 1982-83) should occur in the average only once in every 62 decades or 620 yr.

Karl's perusal of the records disclosed how nature has a way of compensating one section of the country with above normal temperatures when it is delivering bitter winter cold to another section.

Recent studies of winter temperatures during the past century have shown that when relatively cold winters hit the Southeast, temperatures in the Pacific Northwest and West Coast states tend to be above or near normal. When the Southwest and West Coast states have a relatively warm or cold winter the Northeast tends to have just the opposite conditions. This balancing act goes on all over the country, with cold weather being matched by warm weather elsewhere, or vice versa.

The reason for these regional differences can often be explained in terms of preferred positions of the meanderings of the jet stream of air circling above the earth at tens of thousands of feet. During particularly extreme winters this jet stream of air tends to meander less than normal and appear anchored in position.

Karl provided the table below to support his conclusions about "How went the weather?" in the past 10 winters:

Regional Breakdown

Northeast: Conn., Del., Maine, Md., Mass., N.H., N.J., N.Y., Pa., R.I., and Vt.
East North Central: Iowa, Mich., Minn., and Wis.
Central: Ind., Ill., Ky., Mo., Ohio, Tenn., and W. Va.
Southeast: Ala., Fla., Ga., N.C., S.C., and Va.
West North Central: Mont., Neb., N.D., S.D. and Wyo.
South: Ark., Kan., La., Miss., Okla., and Texas.
Southwest: Ariz., Colo., N.M., and Utah.
Northwest: Idaho, Ore., and Wash.
West: Calif., and Nev.
National: all 48 contiguous states.

IRAS DISCOVERS GIANT DUST SHELL AROUND THE STAR BETELGEUSE

Astronomers studying data from the Infrared Astronomical Satellite (IRAS) at the University of Groningen, the Netherlands, have discovered three giant dust shells that are asymmetrically placed around the star Betelgeuse.

IRAS, which was launched January 25, 1983, is a joint project of the United States, the Netherlands and the United Kingdom.

It was already known that Betelgeuse, a red supergiant star, loses material. The IRAS data show evidence for the presence of dust shells which extend more than 4 light-years from the star. At this distance, the material must have left the star 100,000 years ago. IRAS observations thus allow astronomers to study the earliest stages in the episode of mass loss.

A surprising result is the strong asymmetry in the distribution of dust around Betelgeuse. While it is thought that the process of mass loss is more or less symmetrical around the star, all material observed there by IRAS is seen north of the star. A possible reason for this asymmetry is a strong deformation of the symmetrically ejected material by the ambient interstellar gas through which Betelgeuse moves.

Betelgeuse is one of the brightest stars in the constellation of Orion. It is conspicuously red and belongs to the class of red supergiants. It is 1,000 times larger than the Sun; if placed in our solar system, it would extend to the planet Jupiter.

RETIREMENTS

Mr. Edgar J. George (fig.40a) returning from South Africa decided to make it his last trip and elected to retire after 47 yr of sailing. Jim went to sea in 1936 and experienced World War II, the Korean and Vietnam struggles which provided him some memorable moments in his career. He has sailed on most types of vessels but recently he has been on the more familiar names such as Delta and Lykes Lines.

Figure 40a.--Mr. Edgar George.

As Navigation Officer Mr. George has been a long standing contributor to the Ships Weather Observer Program and he has numerous storm and hurricane thriller experiences to recount.

Very best wishes for a long and most happy retirement.

Figure 40b.--Captain Robert Kirby.

Captain Robert G. Kirby, (fig.40b) Master, S. S. EXXON BOSTON, departing on his last trip from Baytown, Texas to the West Coast retired after 38 yr sailing with the EXXON Fleet. Captain Kirby has been master on a number of EXXON ships but was Permanent Master on the BOSTON for the last 3 yr.

Words of thanks are inadequate for Captain Kirby's excellent and consistant support of the Ships Cooperative Weather Observer Program. His ship's consistently high number of weather reports, radio and mail, testifies to his splendid cooperation.

Captain Kirby makes his home in Houston, Texas where he plans to retire. Best wishes for a most happy retirement.

NASA BEGINS NEW STUDY OF TROPOSPHERE'S CHEMISTRY

NASA has begun a major research effort in its continuing study of the global troposphere's chemistry and interaction with the stratosphere and with the earth's land and oceans.

More than 20 scientists from 16 research organizations recently gathered at NASA's Wallops Flight Facility on Virginia's Eastern Shore to conduct an intercomparison of several relatively new, high technology instruments for monitoring atmospheric trace species.

Called the Global Tropospheric Experiment, the program is expected to expand through the next decade to include global monitoring missions to learn more about the troposphere and, assess the susceptibility of the global atmosphere to chemical change.

The experiment is managed by NASA's Langley Research Center as part of the Tropospheric Chemistry Program of the NASA Office of Space Science and Applications in Washington, D.C.

Human activities have a strong effect on the global atmosphere. Prime examples are the increasing level of carbon dioxide, caused mainly by the widespread burning of fossil fuels, and the probable depletion of ozone in the stratosphere through photo-chemistry based on nitrogen and halogen compounds. Other gases, which may have an impact on atmospheric chemistry such as methane and nitrous oxide, are also believed to be increasing.

The Global Tropospheric Experiment reflects growing concern about the atmosphere's lower region. While measurements have been made of specific urban pollution areas, no global study has yet been initiated.

The first phase of the experiment is to develop, test and evaluate techniques that will achieve, under a variety of field conditions, the extreme sensitivity required to measure concentrations of key chemical species in the lower atmosphere. These trace species can have extremely low concentrations, yet still exert great influence on the composition and radiation balance of the atmosphere.

During this intercomparison of measurement techniques special attention is being given to the measurement of hydroxyl, nitric oxide and carbon monoxide.

Other meteorological and atmospheric constituent data will be analyzed to help interpret any differences between the techniques being tested.

The Wallops-based instrument intercomparisons will last about one month. The instruments will then be installed aboard an aircraft for a series of airborne intercomparisons. Flights are planned from the island of Barbados in the West Indies, flying in the tropical boundary layer over the ocean and over tropical forests. The tropical climate will expose the instruments to a wide range of water vapor, marine and continental aerosol, and natural hydrocarbon concentrations.

A third series of instrument and technique intercomparisons will be conducted over the mid-

continental United States. Again installed aboard an aircraft, the instruments will be flown in the upper troposphere, where irregularities in the boundary between the troposphere and the stratosphere provide a wide range of concentrations of ozone and other key species.

At the end of the three series of intercomparisons, leading atmospheric scientists, will carefully analyze the results, which will provide guidance as to what techniques and measurement strategies to use in later phases of the program.

Long-range plans call for global aircraft sampling in the late 1980s, followed by space-based measurements in the early 1990s.

Both of these phases of the experiment will focus on wide-spread and systematic investigations of the principal processes that govern the key chemical cycles in the global troposphere.

LONG-TERM WEATHER EFFECT SEEN FROM MEXICAN VOLCANO

The El Chichon volcano may cause an annual drop of a quarter of a degree Celsius in the earth's temperature beginning next year, a federal report says.

The recently issued 1982 annual report of the National Climate Program says the eruption of the Mexican mountain caused atmospheric opaqueness more than 10 times that caused by the Mt. St. Helens volcano, and is comparable to the largest volcanic clouds of the past 100 yr. About five percent of direct solar radiation in the northern tropics is being blocked by El Chichon particles, resulting in the possible temperature drop.

Carbon dioxide in the air also continues to increase at a rate closely correlated with increasing use of fossil fuels, the report notes, but the warming that had been expected from its past growth has not been detected.

The report describes major climatic events and related research during 1982. Among possible changes in world climate, it says deep sea water in the North Atlantic and off Labrador is becoming markedly cooler and less salty. While the reasons are not known, the report says "it could indicate that fresh water is being added by melting polar ice, brought on by climatic warming."

A major 1982-83 climate event, the report says, was the 1982-83 El Nino phenomenon that affected weather patterns in both hemispheres. Every few years sea-surface temperatures in the equatorial eastern Pacific become warmer than normal, extending from the coastline of Ecuador and Peru westward along the equator until more than a quarter of the earth's circumference is covered. This becomes part of a vast system of ocean-atmosphere climate fluctuations and the size of the 1982-83 El Nino made it one of the most unusual and important climatic events of the century.

The unusually high Pacific sea-surface temperatures were associated with abnormal weather in large parts of the globe -- the heaviest rain and worst flooding in 50 yr in Ecuador and northern Peru; heavy rain in California, Louisiana, and Cuba; and crippling drought in other areas of the world.

The report was produced by the National Climate Program Office of the Commerce Department's National Oceanic and Atmospheric Administration. The office represents 17 federal agencies with climate-related programs.

Single copies of the report are available, free, from the National Climate Program Office, NOAA, 11400 Rockville Pike, Rockville, Md. 20852.

'HURRICANES' IN ARCTIC TO BE STUDIES BY NOAA

National Oceanic and Atmospheric Administration weather researchers this winter will study Arctic "winter hurricanes," devastating storm systems that unexpectedly sweep across northern waters, endangering off-shore oil rigs, shipping, and other human activities in the high latitudes.

Additionally, the scientists will attempt to estimate how much carbon dioxide (CO_2) is transferred from the atmosphere into the depths of the North Atlantic during winter storms when the ocean waters are their most efficient in absorbing CO_2.

The amount of CO_2 in the earth's atmosphere is of concern because scientists believe that increased levels will result in major warming of the earth and other changes in climate.

The carbon dioxide studies were to be done the last 2 weeks in January on research flights from Keflavik, Iceland. Throughout February, the researchers will be based at Bodo, Norway, concentrating on polar lows; low pressure areas formed in the Arctic.

"Winter hurricanes" may be the high-latitude counterpart of summer hurricanes in the lower latitudes, according to Dr. Melvyn Shapiro, NOAA senior meteorologist on the study.

Polar LOWs occur not only in the North Atlantic and the Norwegian and Barents Seas, but also, to a lesser extent, in the Gulf of Alaska and the Bering Sea.

Like a hurricane, a typical polar LOW has a spiral cloud pattern and winds in excess of 75 miles an hour. The storms are smaller than most hurricanes, and some, but not all, develop an "eye" like a hurricane.

Only recently documented, the polar LOWs develop rapidly, causing high seas extremely dangerous to shipping and to off-shore oil activities.

Understanding the LOWs will lead to many practical applications as human activities extend more and more to higher latitudes. Design of off-shore oil facilities, for example, may be modified because of the unique wave forces resulting from the LOWs.

The CO_2 study is intended to help researchers better estimate how much carbon dioxide is absorbed by the oceans world-wide.

Also participating in the studies will be scientists from NASA, the U.S. Navy, Great Britain, Norway, and Iceland.

FACSIMILE TEST (Continued)

Return the facsimile test charts with comments to: NAVEASTOCEANCEN, Bldg. U-117, NAS, Norfolk, VA 23511.

LETTERS TO THE EDITOR

The following letter was written to a friend by a crewmember of the S.P. LEE a U.S. Geological Survey vessel. The vessel was rounding Cape Palliser and crossing Palliser Bay of Cook Strait, New Zealand.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

December 26, 1983
Wellington, New Zealand

A belated Merry Christmas from the S.P. LEE! Now that the festivities have wound down a bit, I'm sending you this rather curious pressure phenomena we experienced while rounding Cape Palliser prior to reaching Wellington (fig. 41).

From 0300Z to 0500Z we experienced "williwaws" blowing from the valleys along the coast. Our wind-speed guage read 45-60 knots during these periods. (60 knots is the maximum speed that it registers.)

Thought you might find this interesting. Have a wonderful New Year's.

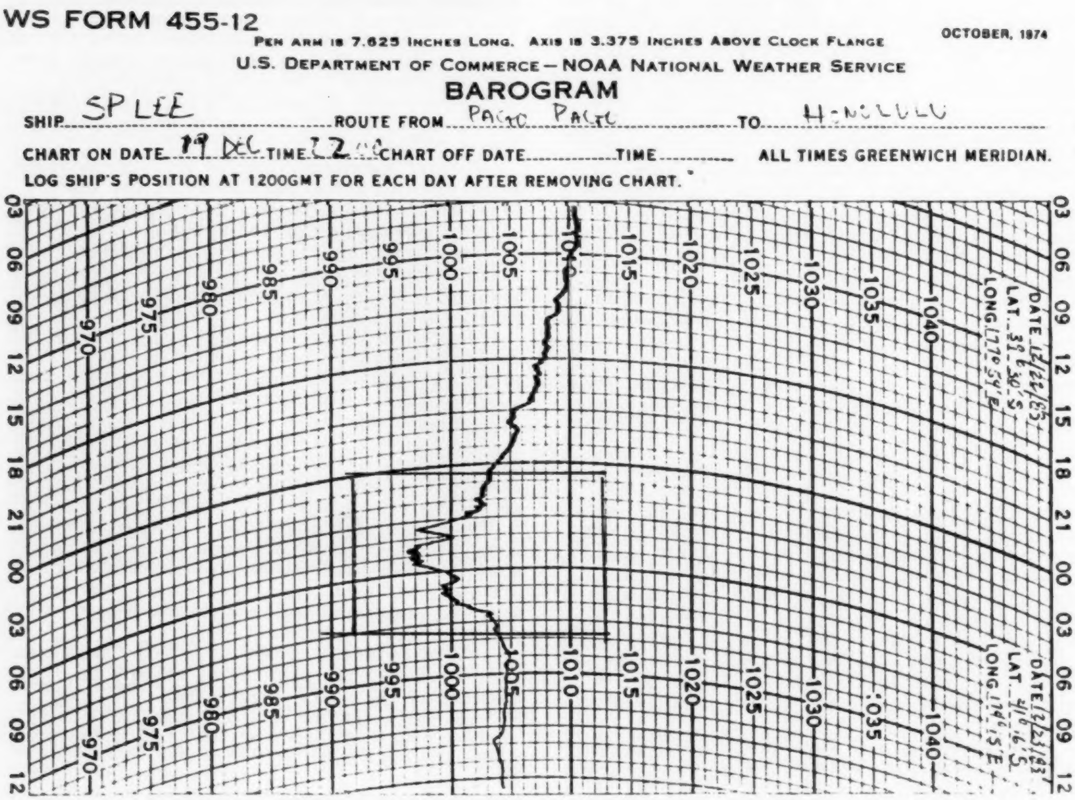


Figure 41.--Part of the barogram from the S.P. LEE as they crossed Palliser Bay.

MARINE WEATHER REVIEW

The Weather Logs combined with the cyclone tracks, U.S. Ocean Buoy climatological data, gale and wave tables, and mean pressure patterns are a definitive report on the weather systems and primary storms which affected the North Atlantic and North Pacific Oceans during this 3-mo period. Hurricane Alley lists and describes tropical cyclones worldwide. Unless stated otherwise, all winds are sustained winds and not gusts; all times are G.M.T.

North Atlantic Weather Log

July, August and September 1983

WEATHER LOG, JULY 1983--The primary storm track that effected the major North Atlantic shipping lanes stretched from Sable Island to the Denmark Strait. There was a disorganized area of low-pressure tracks northward from the Labrador Sea into Baffin Bay. A storm crossed from Newfoundland to Ireland. Another moved northeastward from off Cape Hatteras to near 45°N, 40°W.

The sea-level pressure pattern was near normal in overall configuration (fig. 42). The primary feature was the 1028 mb Azores High centered near 38°N, 37°W. This was within a few miles of its climatological normal location but 3 mb higher in pressure. The weak multi-centered Icelandic Low had three centers of 1006 and 1007 mb over the entrance to Frobisher Bay, over Angmagssalik, and 60°N, 10°W. These were 2 to 3 mb lower in pressure than their three climatological counterparts.

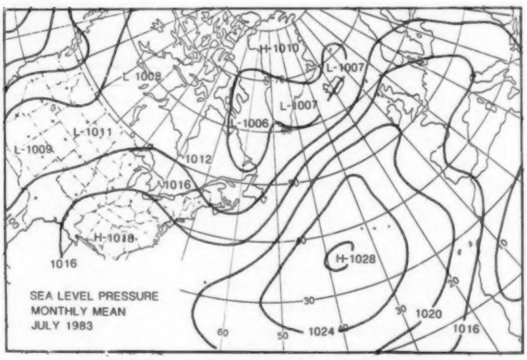


Figure 42.-- Mean sea-level pressure.

The most significant anomaly center was plus 6 mb. It was elongated in shape and stretched from about 30°N, 40°W to 50°N, 30°W to 55°N, 15°E. There was a minus 5 mb anomaly center near Angmagssalik, with a minus 3 mb subcenter in the overall negative area near Sable Island.

The upper-air flow at 700 mb reflected more major differences from climatology than the surface. There was an anomalous High center over northern Mississippi, an anomalous Low center over Davis Strait and another near Cape Finisterre. The primary High over the central ocean near 31°N, 44°W ridged northeastward to near 50°N, 30°W. These height centers resulted in a sharp trough along the North American East Coast, the ridge over the central ocean and the Low and sharp trough west of Spain and Portugal. There was a 10° to 15° latitude wide band of straight flow from Nova Scotia to the Faeroe Islands.

Some Climatology. In 1966 the temperature soared to 104°F at Philadelphia on the 3d. On Independence day 1911, the northeast sweltered with 100°F temperatures. There was 105°F in Vermont and 106°F in New Hampshire and Massachusetts, the hottest on record for the three States. On the 5th in 1916 Mobile, Ala. was hit by their worst hurricane ever. The winds reached 82 mi/hr, the tide rose 11.6 ft above normal, and the pressure dropped to 28.92 in (979 mb). On the 9th in 1936 the temperature hit an all time high of 106°F in Central Park in New York City. On July 23, 1788 George Washington recorded that the center of a hurricane passed directly over Mount Vernon.

Extratropical Cyclones--The month started out with high pressure centered near 40°N, 30°W. It drifted westward as far as 35°N, 50°W increasing to 1035 mb and then weakening. Low pressure centers moved along the primary storm track.

During the second week a LOW off Ireland drifted southward and remained quasi-stationary southwest of ROMEO most of the week. At midweek high pressure built south from Greenland, blocking the central ocean along approximately longitude 40°W from latitudes 15° to 80°N. The ridge broke down at the end of the week leaving a high-pressure cell near 50°N, 35°W. The LOWs were weak.

The HIGH in the northern latitudes persisted into the third week, but by midweek moved south and normal configuration. Two large LOWs were present near Newfoundland and the Norwegian Sea. At the end of the week a large 1034 mb bent pear shaped HIGH stretched from Florida to the United Kingdom.

The United Kingdom part of the HIGH moved to the Balkans the fourth week. A large LOW developed off New England and the Canadian Maritime Provinces. At midweek the HIGH built northeastward and was 1040 mb near 47°N, 22°W

at the end of the week. Another LOW was off Nova Scotia. By the end of the month the HIGH had drifted southward. LOWs were off the U.S. East Coast northeastward to Iceland.

This first storm was over southwestern Ontario, Canada on the 1st. It raced eastward and the center crossed the Labrador coast about 0600 on the 2nd. At 0000 on the 3d the CANADIAN EXPLORER (53°N, 43°W) found the first gale. By 1200 the LOW was 974 mb near 62°N, 35°W (fig. 43). The INGOLF (65°N, 35°W) had 37-kn winds out of the northeast with 18-ft seas. The VERKHOVINA (60°N, 32°W) had 43-kn westerly winds and 13-ft waves. The 1800 group of observations showed several 50-kn wind reports and many gales in the vicinity of 61°N, 34°W. A U.S.S.R. ship UUON (61°N, 33°W) radioed 50-kn winds from the southwest and 30-ft seas. Winds up to storm force and seas up to 17 ft continued into the 4th. The storm stalled near 65°N, 30°W, where it remained stationary into the 6th and dissipated. Some high swell persisted east of the storm into the 5th.

Figure 43.-- A deep LOW for a summer month.

This LOW formed in the trough of the storm above on the 6th west of Cork, Ireland. At 1200 on the 7th it was 1000 mb near 54°N, 17°W. The DART EUROPE (53°N, 21°W) had 39-kn northerly winds. The EDOUARD L.D. measured 42-kn winds from the southeast at 44°N, 09°W on the 8th. The storm was quasistationary near 45°N, 18°W for 96 hr through 1200 on the 12th (fig. 44). On the 17th the IRON KERRY (39°N, 12°W) reported 47-kn winds. On the 12th the storm started moving southeastward toward the Azores. On the 13th, it was 1010 mb near 39°N, 26°W. On the 14th it was again moving northeastward and dissipated on the 15th.

An inverted trough south of Bermuda was the source of this storm on the 10th. At 1200 on the 11th the SEA-LAND PRODUCER (32°N, 61°W) had

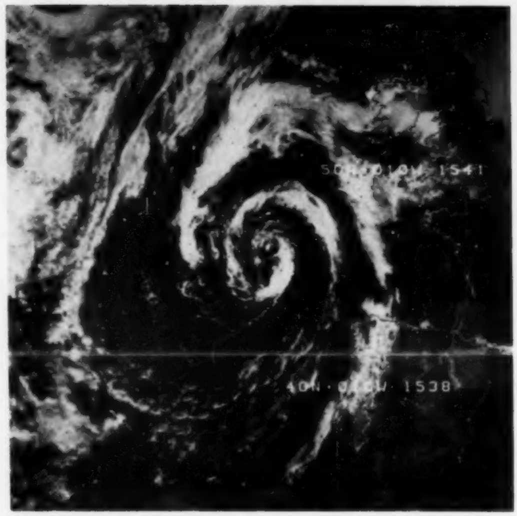


Figure 44.-- The storm as it appeared at 1540 on the 10th.

32-kn westerly gales with 20-ft waves. The MELTON CHALLENGER (39°N, 55°W), north of the center, measured 42-kn easterly winds and 10-ft waves. At 1200 on the 12th, the 1002-mb storm was near 42°N, 59°W. Several ships were reporting gales and waves up to 20 ft. The RIGG at 44°N, 60°W measured 48-kn easterly winds and 20-ft seas. A ship nearby measured 52 kn. On the 13th, the storm turned northwestward toward a complex LOW that had developed over New England. The BARBER TAIF (40°N, 68°W) found 50-kn southerly winds. This LOW no longer existed on the 14th.

This was the complex LOW mentioned above. It consolidated into one 1002 mb LOW near 42°N, 63°W on the 14th. On the 15th the MAYAGUEZ (41°N, 55°W) and the SEDCO 706 (47°N, 49°) both reported 35-kn gales. At 1200 on the 16th the 997-mb storm was over eastern Anticosti Island. SEDCO 706 was still reporting winds of 35 to 40 kn every 3 hr through the 17th. The ROSTAND near 40°N, 53°W was reporting 20-ft waves. At 1200 on the 19th, the 984-mb storm was near 58°N, 48°W. The SUNEMERILLON (54°N, 56°W) measured 40-kn northwesterly winds, 18-ft seas, and 21-ft swells. The storm was north of Iceland on the 21st and over the Greenland Sea on the 23d.

A frontal wave north of Lake Ontario spawned this storm on the 21st. By 1200 on the 22d it was south of Cape Sable at 990 mb (fig. 45). There were some gale reports late in the day. There were many gale reports on the 23d in the southeast quadrant. The GARDEN MOON (40°N, 56°W) reported 55-kn winds from the southwest with 34-ft seas, and 35-ft swells. A ship near 46°N, 48°W reported 50-kn southerly winds, not far away another had 23-ft waves. On the 24th, the LOOSDRECHT (41°N, 57°W) found 15-ft seas and 30-ft swells and the DEFIANCE (39°N,

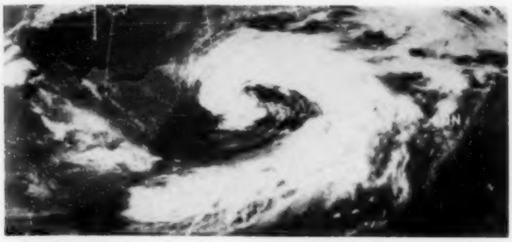


Figure 45.-- A synchronous satellite view of the storm at 1700 on the 22d.

54°W) had 15-ft seas and 33-ft swells. The storm was over the Denmark Strait on the 26th and continued northward along the Greenland coast. A weather station on the northwest coast of Iceland measured 40-kn winds on the 27th.

This persistent but weak frontal wave formed over Montana on the 20th. It moved off the New Jersey coast on the 24th and started to deepen. On the 25th, the GARDEN MOON was at 34°N, 64°W with 47-kn winds. At 0000 on the 26th the storm was 993 mb near 43°N, 60°W. The CYGNUS (41°N, 50°W) had 55-kn southerly winds with 15-ft waves. Late in the day the MARJORIE LYKES (41°N, 49°W) measured 30-kn winds from the south and 20-ft waves. On the 27th SEDCO 706 measured 40-kn winds and CHARLIE had 35-kn with 16-ft seas.

The storm was over Kap Farvel at 0000 on the 28th. A Soviet ship UFOM (60°N, 35°W) had 43-kn winds and 21-ft waves. On the 29th the MAGNUS JENSEN (60°N, 48°W) reported measuring 58-kn winds. The storm was over the Davis Strait at 1200 and dissipated as another center formed along the Greenland coast to the southwest.

Casualties. Strong thunderstorms struck northern Greece on the 21st and 25th. Winds up to 70 mi/hr were reported. It was estimated that over 660 people were caught offshore in fishing and pleasure boats. Many vessels were overturned. Thessaloniki port officials said 266 people were rescued. Twelve people were reported dead and five missing after several days of searching.

The following ships collided in fog. The POLAR BEAR and AROSIA off Morte Point, England. The KIEL and ALOHA M. near Plymouth. The ferry YANKEE and HARBEL TAPPER between Providence and Block Island with 140 passengers aboard. No report of injuries.

The ANA DEL MAR and MEONIA grounded in fog at Felixstowe.

The tugs DUGA and TOGA reported ice damage at Tuktoyakstuk during July and September. The MESANGE suffered ice damage enroute to Wakeham Bay, Canada.

The RIXTA OLDENDORFF reported weather damage.

WEATHER LOG, AUGUST 1983--The majority of the significant storms occurred the last half of the month. There were weak short-lived LOWs the first half of the month that do not show on the track charts because they existed less than 36 hr. Their track was generally along the extreme northwest edge of the ocean from Newfoundland to the Greenland East Coast. The primary track later in the month was more diverse but a rough average would be from about 40°N, 65°W to Iceland. One storm the third week tracked eastward between 45° and 50°N into the English Channel.

The mean sea-level pressure pattern was typical summer time with a large 1028 mb Azores High near 38°N, 30°W (fig. 46). This was 5 mb higher than normal and 300 mi to the northeast. Ridges stretched into the eastern United States and Europe. The Greenland High was missing and a weak 1005 mb Low was over the Greenland icecap near 70°N, 45°W. A 1000 mb Low was over the eastern Barents Sea.

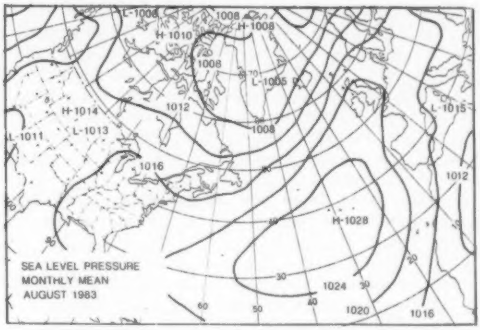


Figure 46.-- Monthly mean sea-level pressure.

The primary anomaly center that affected marine weather over the shipping lanes was plus 9 mb over the United Kingdom. There was a minus 9 mb anomaly center over central Greenland and a minus 12 mb center northwest of Novaya Zemlya. The zero isoline stretched from Cape Chidley to 55°N, 45°W to Iceland to Bodo, Norway. Pressures over the eastern United States and Canada were slightly positive.

In the upper air at 700 mb there was an anomalous LOW near Disko Island, Greenland instead of a trough in the area. The long-wave trough along the North American East Coast was sharper than the normal slightly off the New England Coast. There was relatively straight zonal flow northeastward from Newfoundland to Bodo, Norway about 15° of latitude wide. Troughing along the western Europe coast did not occur except over Portugal.

Hurricanes Alicia and Barry occurred this month.

Some Climatology. On the 6th in 1843, severe thunderstorms struck near Philadelphia with as much as 16 in of rain in 3 hr. Flooding destroyed 32 bridges with 19 deaths. Thirty barges were sunk on the Schuylkill River. On the 9th in 1882 a ship on Lake Michigan had 6 in of snow and slush dumped on its decks. Snow showers were observed on shore. On the 11th in 1940, a hurricane struck Savannah, Ga. and Charleston, S.C. with the worst inland flooding since 1607.

On the 25th 1982, a deep low-pressure system was over New England. Syracuse, N.Y. had a

record low pressure of 29.34 in of Hg (993.6 mb) and Burlington, Vt. had a record 29.28 in of Hg (991.5 mb). On August 26, 1949 a hurricane made landfall at Delray Beach, Fla. Winds reached 153 mi/hr at Jupiter lighthouse before the anemometer failed. On the 29th, 1971 heavy rains from tropical storm Doria caused devastating flooding in New Jersey, and flooded streets and subways in New York City. On August 31, 1954 hurricane Carol swept across New England killing 60 people.

Extratropical Cyclones--High pressure was the major meteorological feature over the North Atlantic the first week of the month. Anticyclonic curvature extended to latitude 50°N and drifted eastward by midweek. At the end of the week the HIGH stretched from southwest of the Azores to the North Sea. A LOW developed over Portugal. During the week, weak LOWs and frontal waves followed a path from Nova Scotia to the Denmark Strait. The same pattern continued until midweek of the second week. At this time the HIGH over the United Kingdom dissipated. By the end of the second week the LOWs were becoming larger and stronger.

The third week found the Azores High south of latitude 40°N and weak. A LOW traveled eastward from near Cabot Strait between latitudes 45° and 50°N to the English Channel. By the end of the week the Azores High was back over the Azores.

The Azores High was moving northeastward during the fourth week and the LOWs were intensifying. By the end of the week there was a HIGH west of Ireland and the LOWs were again weak. The end of the month found a strong LOW developing off the east coast of the United States.

This first storm was only minimally significant. It formed in a trough south of Kap Farvel on the 4th. At 0000 on the 5th LIMA had 20-ft swells. At 1200 the NIKEL (56°N, 34°W) had 35-kn winds near the front. At 0000 on the 6th the 992-mb LOW was on the Greenland East Coast at 65°N. At 1800 the FIRMNES (54°N, 48°W) had 33-kn winds and 20-ft swells. The LOW disappeared on the 7th.

Another short-lived LOW that beat itself out against a midocean HIGH was first analyzed near Cape Hatteras on the 5th. The KENNETH E. HILL (37°N, 70°W) measured only 26-kn winds south of the center but the swell waves were 20 ft. At 1200 on the 7th the storm was 1000 mb near Halifax, Nova Scotia (fig. 47). The RIGG near 44°N, 59°W measured 40-kn southeasterly winds. On the 8th, the TAKASAKA (46°N, 52°W) measured 40-kn southwest winds and SEDCO 706 measured 43 kn. The storm weakened as it raced into the Denmark Strait by the 10th and dissipated.

This frontal wave formed over Cape Sable on the 10th. It was 1002 mb near 53°N, 52°W at 1200 on the 11th. SEDCO 706 (47°N, 48°W) measured 42-kn winds and the J.E. JONSSON (46°N, 48°W) measured 44-kn winds early in the day. On the 12th the JOHAN PETERSEN (58°N, 45°W) measured 52-kn easterly winds and 20-ft seas as the storm passed south of her. As the storm moved

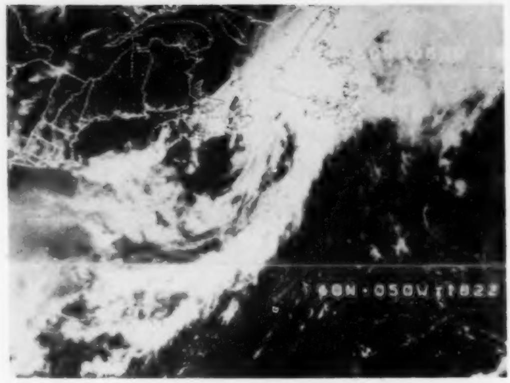


Figure 47.-- At 1800 the storm was near Sydney.

over Iceland on the 14th, the circulation expanded but there were no high winds. On the 15th another center formed off the Norwegian Coast and the original center disappeared. MIKE measured 40-kn winds.

This storm developed from a complex multicentered LOW that moved across the Appalachian Mountains on the 11th and 12th. When the circulation moved over the ocean on the 12th it reverted to an open frontal wave configuration. By the 13th the northeastern wave was intensifying south of Newfoundland. The J.E. JONSSON (47°N, 48°W) measured 50-kn winds out of the southeast which were 40-kn from the northwest on the 14th.

The storm was 1002 mb at 0000 on the 15th near 50°N, 32°W. The STAR CARRIER (50°N, 33°W) measured 50-kn northwesterly winds with 25-ft seas and 21-ft swells. The ALMERIA LYKES (46°N, 30°W) found 45-kn northwesterly winds, 12-ft seas, and 39-ft swells. The swell report may be a communications error but the direction and period were within reason and I wasn't there. At 1200 on the 16th the storm was 996 mb near 46°N, 22°W. There were several ships in the area of 40° to 45°N and 25° to 40°W that reported winds of 30 to 40 kn and waves of 20 to 25 ft. The SCHWABENSTEIN (40°N, 27°W) reported the highest waves off 25 ft. The 20 plus-ft waves continued into the 17th.

The storm was weakening on the 18th and eventaully dissipated over the English Channel on the 22d.

The eastern slopes of the Canadian Rocky Mountains produced this potential storm on the 18th. Its influence over the salt water began being felt late on the 20th. Gales were blowing in the eastern semicircle on the 21st. The IRISH ROWAN (53°N, 44°W) had 40-kn easterlies with 18-ft waves. The WKPZ measured 45-kn winds with only 10-ft seas near 47°N, 62°W, they were 48 kn on the 22d. The TFL EXPRESS (44°N, 56°W) had 44-kn westerly winds with 20-ft seas.

At 1200 on the 23d the storm was 987 mb near 59°N, 40°W (fig. 48). The FRITHJOF (60°N, 43°W), right at Kap Farvel, had 48-kn northeasterlies with 20-ft seas. The OCEAN RANGER sank on the 23d, about 215 mi east of

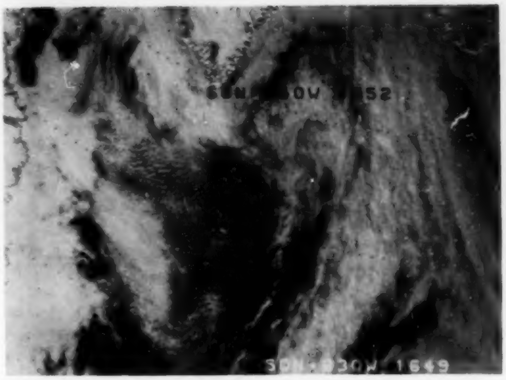


Figure 48.-- The rugged Greenland coast and high altitude of the ice cap destroyed the normal configuration.

Cape Race, after being buffeted over night by 25-ft seas while being towed to a place of final disposal. The storm rapidly weakened as it moved up the east coast of Greenland.

Monster of the Month--This LOW could have become a tropical storm but before it got started a front swept southward into the circulation. It was first analyzed on the 26th about midway between Jacksonville, Fla. and Bermuda in an area of easterly flow. The storm developed rapidly on the 30th. The Canadian VCWB (46°N, 48°W) measured 44-kn easterlies and 15-ft seas. By 1200 on the 31st the 984-mb storm was at 47°N, 45°W. There were several wind reports of 50-kn or greater. The WEST VENTURE (47°N, 49°W) measured 58-kn northerly winds with only 15-ft waves. The GEORGE OUSHAKOV (45°N, 48°W) had 43-kn northwesterly winds and 23-ft seas.

Figure 49.-- The storm is in its mature stage at 1640 on September 1.

By September 1 at 1200 the storm was 962-mb near 50°N, 26°W (fig. 49); a very deep extratropical storm for this time of year. There were many storm-force wind reports and several of hurricane force. Waves up to 41 ft were observed. The PACIFIC PEACE, TFL LIBERTY, and VRNZ all reported winds over 64 kn in the vicinity of 50°N, between 25° and 30°W. The PACIFIC PEACE had the 41-ft waves. On the 2d at 0000 ROMEO had 47-kn westerly winds with 49-ft seas. At 1200 the storm was 968 mb at 54°N, 10°W over the northwest coast of Ireland. There were still many storm-force winds and the PECHEUR BRETON (47°N, 12°W) reported 65-kn winds with 39-ft seas. The CARIBIA EXPRESS (47°N, 16°W) found 55-kn westerly winds with 30-ft seas and 46-ft swells.

At 1200 on the 3d the storm had weakened to 984 mb as it moved over the United Kingdom but there were still storm-force winds and waves up to 25 ft. The storm was tracking up the coast of Norway on the 4th and dissipated on the 5th.

The storm hit Britain and Ireland with 80 mi/hr wind gusts killing at least six people. A yacht sank in 60-ft waves off southwestern England. Six yachts were in trouble and transmitted "Mayday's." One reported force 10 to 11 winds, sea state 8 and swell 9. The HYDO in tow of the tug AZNAR JOSE went aground near Ushant. The SIMBA last 18 containers overboard 500 mi southwest of Brest.

The SOUTHERN DIAMOND had heavy weather damage after leaving Antwerp and the C.S. ARADIS was abandoned by its crew off Ushant on the 3d.

Casualties--The following ships suffered ice damage: PAULINA C. and GENERAL BEM on Hudson Bay, the PENNYSMART and MESANGE.

The LONELIL and EBN MAGID collided in fog. The LONELIL sank off Cape Silleiro with two crewmen missing.

The following ships suffered weather damage: EDITH ESSBERGER (Aug. 1), OMEGA LADY (1st and 2d), PAROS (3d and 4th), NEPTUNE-GASCOGNE (3d), VERNICOS GIANNIS (9th), HBC 1000 (20th), NINA JUNIOR (23d).

The CASTILLO DE BELLVER (fig. 50) with 250,000 tons of oil had an explosion and caught fire about 68 mi northwest of Cape Town at 2348 August 5. She broke in two about 8 hr later. Waves at the scene were reported to be 30 ft. Three of the 36 crewmen were missing. The stern section sank the night of the 6th. The bow section was towed to deeper water and was sank on the 13th.

The RENAICO almost capsized on the 25th after being struck by a gigantic wave 200 mi from Cristobal enroute from Houston. The wave damaged the port side and hurled nine containers overboard.

WEATHER LOG, SEPTEMBER 1983--There was a parade of storms from the southwest to the northeast across the North Atlantic mainly between latitudes 45° and 65°N. A few LOWS tracked along the western coast of Greenland. Also there were three LOWS off the southeast

Figure 50.-- A fireboat sprays water on the bow of the CASTILLO DE BELLIVAR, which caught fire late on August 5. She broke in two about 8 hr later in seas reported as 30 ft. She was carrying 73 million gallons of crude oil. Wide World Photo.

U.S. Coast south of latitude 39°N. A mean track for the month would stretch from about Cape Cod east-northeastward to 53°N, 25°W. From there the tracks spread out from eastward to northward. There was a secondary path from Hamilton Inlet to about 57°N, 40°W. Five storms tracked over the United Kingdom and the North Sea.

The Icelandic Low consisted of two centers, a 1005-mb near 58°N, 22°W and a 1004-mb center near 70°N, 12°E (fig. 51). The climatological Icelandic Low is 1005 mb near 62°N, 30°W. The Azores High was 1023 mb near 30°N, 40°W. This was 2mb higher and 400 mi southwest of its climatic counterpart. High pressure over the eastern United States and the Mediterranean was slightly above normal.

The anomaly chart had a minus 6-mb center near 45°N, 23°W and a minus 4-mb center near Oslo. There was a plus 5-mb center over the Denmark Strait and a plus 8-mb center over Home Bay, Baffin Island.

In the upper air at 700 mb the flow was near Zonal between latitudes 40° and 60°N. A trough apparoximately paralleled longitude 25°W. There was an anomalous LOW near Sandra Stromfjord, and an anomalous HIGH over the southern Gulf of Boothia.

Hurricane Chantal and tropical storm Dean, the last of the season occurred this month.

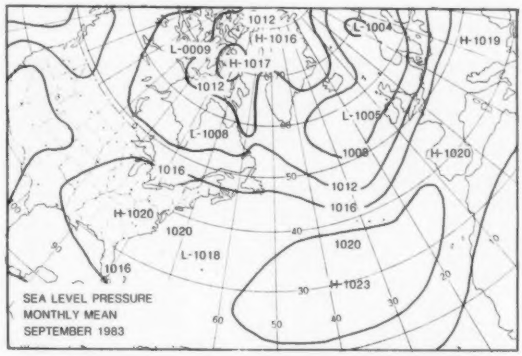


Figure 51.-- Monthly mean sea-level pressure.

Some Climatology--On September 8, 1900 probably the worst weather disaster in the U.S. occurred when a hurricane hit Galveston, Texas. A 5-ft tide washed over the Island drowning more than 6,000 persons and destroyed more than 3,600 buildings. On September 9, 1921 a dying tropical depression dumped 38.2 in of rain on Taylor, Texas. A record 36.4 in fell in 18 hr. On the 11th, 1961 hurricane Carla made landfall near Port Lavaca, Texas with wind gusts of 175 mi/hr. On the 13th in 1979 hurricane Frederick

hit Mobile Bay with 132 mi/hr winds. It was the costliest in U.S. history with $2.3 billion damage. On the 15th in 1752 a great hurricane hit the South Carolina coast with a tide almost to downtown Charlestown. Just before reaching the city the wind shifted and the tide dropped 5 ft in 10 min.

On the 16th in 1928 a monster hurricane killed 600 in Guadeloupe and 300 in Puerto Rico. The storm struck West Palm Beach and Lake Okeechobee swelled to an area the size of Delaware. It killed 2,000 people. On the 19th in 1947 the eye of a hurricane passed directly over New Orleans and the barometric pressure dropped to 946.8 mb. On the 22d, 1938 a hurricane smashed into Long Island and crossed New England causing a massive blowdown of trees and flooding. Winds gusted to 186 mi/hr at Blue Hill, Mass.

On the 23d, 1815 one of the greatest hurricanes to strike New England also made landfall at Long Island and crossed New England. It was the worst in 200 yr and equal to the 1938 hurricane. It was one of a series of severe summer and autumn storms to affect shipping lanes that year. On September 27, 1816 frost occurred across New England killing unripened corn and causing a famine year. On the 28th, 1917 a hurricane struck Pensacola, Fla. with 95 mi/hr wind gusts and a pressure of 651.1 mb. The winds gusted to 75 mi/hr at Mobile Ala.

Extratropical Cyclones--A deep strong LOW that originated in August moved along the major shipping lanes the first of the week. By midweek another LOW followed the first one. At the end of the first week there was a Bermuda High and the Azores High built into France. Yet another LOW was moving eastward north of latitude 55°N.

During the second week the HIGH over Europe continued eastward to over the Balkans. The Azores High redeveloped and at midweek there was a blocking ridge along latitude 20°W. There was generally high pressure south of latitude 40°N. Hurricane Chantal was 800 mi east of Cape Hatteras. By the end of the week the blocking ridge broke down and the parade of LOWs continued.

During the third week the Azores High was well established. At midweek a powerful LOW developed. At the end of the week the Azores High was breaking down and high pressure over Cape Hatteras was moving northeastward.

The fourth week a cut-off LOW developed off Portugal. There was high pressure over the eastern U.S. and an elongated northeast - southwest HIGH from the Norwegian Sea to 30°N, 55°W. At midweek there was a strong HIGH over the central ocean. At the end of the week a strong HIGH moved off Long Island and another covered Europe. Tropical storm Dean formed off the southeastern U.S. Coast. At the end of the month another strong LOW developed.

This storm was east of Boston on the 1st. By 1200 on the 2d the storm was 998 mb near 48°N, 52°W. The SEDCO 706 measured 40-kn winds. The FIVE STAR suffered weather damage off Newfoundland. By 1200 on the 3d the 984-mb center was at 52°N, 29°W. The AMERICAN LEADER (45°N, 27°W) had 55-kn southwesterly winds and 20-ft waves. The MAIN ORE (45°N, 36°W) had only 27-kn winds but the swell was 33 ft. ROMEO had 20-ft swells and reported 26-ft seas on the 4th. The storm was just off northern Ireland at 1200. The CAPE RODNEY (53°N, 15°W) measured 60-kn winds with 20-ft waves. At 1800 the UBNJ had 30-ft seas at 56°N, 13°W. The storm was over Norway on the 5th.

This LOW formed slightly east of Hopedale on the Labrador coast on the 5th. On the 6th a frontal wave moved into its eastern circulation. At 1200 on the 6th the KOMSOMOLSK (56°N, 28°W) just north of the wave had 40-kn easterly winds with 20-ft seas. The FARLAND very near the center at 53°N, 28°W had 48-kn easterly winds and 13-ft waves. By 0000 on the 7th the two centers combined at 980 mb near 58°N, 33°W (fig. 52). The JOHAN PETERSEN and PIOS both were near 58°N, 40°W and measured winds of 50 kn with 13- to 23-ft waves. The INGOLFUR ARNARSON (64°N, 26°W) reported easterly winds of 60 kn or greater several times. The storm was stationary most of the 7th and 8th south of Iceland. The HERMOD (53°N, 26°W) measured 52-kn winds from the northwest with 13-ft seas and 26-ft swells on the 8th. The storm started moving by the 9th and raced to the North Sea where it disappeared.

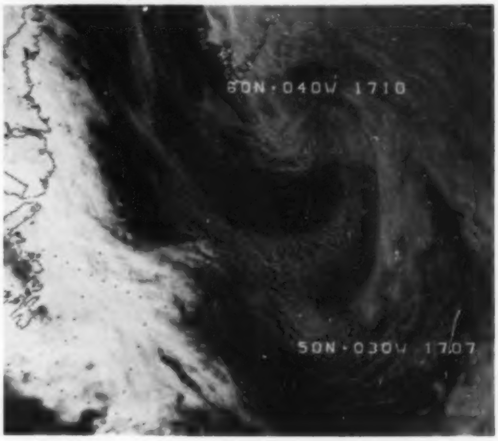


Figure 52.-- The center of the upper circulation was near 59°N, 34°W at this time on the 7th.

About that time another LOW had formed southwest of Ireland and became the primary center. A ship in the Bay of Biscay had 20-ft seas on the 10th. There were gales and high seas off both the east and west coast of Scotland on the 11th. The BEARN (55°N, 00°W) had 30-ft seas. The storm moved over Scandinavia on the 12th and turned northward.

On the 15th a front was parallel to and off the United States and Canadian Coast. Frontal waves were developing and dissipating along the

front. On the 16th one continued to develop into a storm. Gales were blowing on both sides of the front with 10- to 20-ft seas. By 1200 on the 17th the LOW Had plunged to 970 mb near 57°N, 22°W (fig. 53). The ODISSEI (55°N, 20°W) measured 48-kn southerly winds with 36-ft seas.

Figure 53.-- This satellite image verifies the surface analysis exactly.

The CAST CARIBOU (52°N, 17°W) measured 55-kn winds. LIMA had 48-kn southeasterly winds and 23-ft seas. At 0000 on the 18th they were 43-kn from the southwest with 25-ft seas, and 36-ft swells. CHARLIE had 30-kn winds and 20-ft waves. The 850-mb level at LIMA was 3,156 ft with 60-kn southwest winds. At 0300 LIMA had 51-kn winds, 30-ft seas, and 41-ft swells. The LONDON ENTERPRISE (56°N, 16°W) at the same time measured 65-kn westerly winds, 23-ft seas, and 43-ft swells. Other ships in the storm had 40- to 50-kn winds and 20- to 25-ft waves. Gales reached as far north as Iceland. The storm was 958-mb at 60°N, 15°W at 1200. The winds were in the gale and strong-gale category with waves up to 20 ft on the 19th. The storm was over the Norwegian Sea and weakening on the 20th. It moved over Nordkapp on the 21st.

This LOW broke off east of a deep LOW that stalled over Hudson Bay, on the 20th. By 1200 on the 21st it was 995 mb near 52°N, 36°W. The HERMOD (50°N, 42°W) measured 44-kn northerly winds. By 1200 on the 22d it was 982 mb near 51°N, 23°W (fig. 54). A second center had formed about 300 mi to the south-southwest. The AMERICAN ARCHER (50°N, 29°W) estimated 50-kn northerly winds and 20-ft seas. The RAPAHO (45°N, 29°W) measured 55-kn and 28-ft swells. On the 23d the SEA-LAND PIONEER (40°N, 32°W) had 45-kn winds from the north with 17-ft seas, and 30-ft swells. The GCRZ (46°N, 29°W) measured 52-kn winds also from the north with 33-ft seas and 30-ft swells. On the 24th the HERMOD was now at 45°N, 29°W and measured north-northwesterly 52-kn winds, 20-ft seas and 36-ft swells. The ONAB (47°N, 30°W) had northerly 37-kn winds, 18-ft seas and 33-ft swells.

The storm had penetrated to 40°N, 20°W and

Figure 54.-- The secondary center near 47°N, 26°W is the dominate one in the upper air.

had turned back northwestward by the 25th. A few strong gales were still occurring but by the 26th the storm had weakened to less than gale force.

This frontal wave started off Newfoundland on the 26th. At 1800 the VRNZ (52°N, 44°W) had 40-kn winds from the north. On the 27th the AMCO TRADER (46°N, 38°W) measured 45-kn winds and 15-ft waves. At 1200 the storm was 996-mb near 49°N, 33°W. The SANTA CRUZ (50°N, 38°W) had 60-kn northwesterly winds and 20-ft waves. At 1800 the winds were 65 kn and the waves 25 ft. The REYNOLDS (47°N, 33°W) had 25-ft waves. The BISCHOFSTOR (44°N, 25°W) reported 62-kn winds with 20-ft waves on the 28th. The storm was absorbed in the circulation of the next storm on the 29th.

Monster of the Month--This frontal wave was first found on the 0600 chart of the 28th. At 1800 the LUGWIGSHAFEN EXPRESS (42°N, 50°W) found 44-kn winds with 16-ft waves. By 1200 on the 29th the storm was 980 mb near 47°N, 36°W. At 1800 the LUGWIGSHAFEN EXPRESS now at 44°N, 41°W had

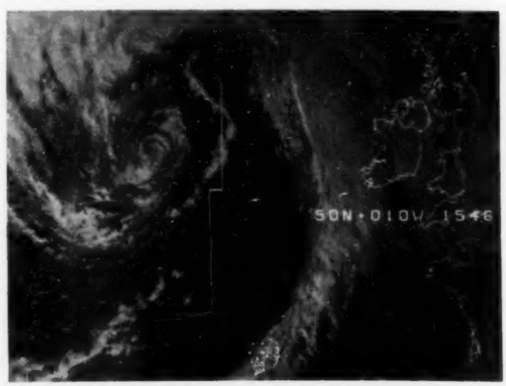


Figure 55.-- This extratropical storm has an eye similar to a tropical storm.

52-kn northwest winds and 20-ft swells. The NICOLA PROSPERITY (47°N, 34°W) had 55-kn westerly winds. By 1200 on the 30th the storm was 962 mb near 50°N, 28°W (fig. 55). A ship very near the center reported 965.5 mb at 1200 and another 954.3 mb at 0600. There were many high wind and wave reports. The W.A. MATHER (47°N, 28°W) measured 61-kn westerly winds and 38-ft waves, at 1800 the waves were 46 ft. The LACKENBY (49°N, 23°W) measured 52-kn southerly winds with 41-ft waves. There were several reports of about 70-kn but there were either no waves reported to at least partially verify the wind speed or they appeared to be too small for that high of wind. One was the EDITH NIELSEN (61°N, 13°W) with 72 kn from 120° and only 18-ft seas.

On October 1 a second center formed about 600 mi south-southwest of the primary center. The winds were not as strong nor the waves so high. They were mostly in the gale range with a few of storm force and the waves 15- to 20-ft and a few over 25 ft. Waves up to 20-ft continued into the 2d with 30-ft swells reported near 45°N, 35°W. On the 3d another secondary LOW was south of the primary center. The MAGNUS JENSEN (57°N, 40°W) reported 47-kn northwest winds and 33-ft waves. The storm deteriorated rapidly on the 4th and was gone on the 5th.

Casualties--The platform ALEXANDER L. KIELLAND was finally turned upright near Sandnes, Norway. The BLAVET had a collision in fog off Cape Finisterre. The FEARLESS and GERHARD collided in fog off Portland Bill. The MATHILDA DESGAGNES had ice damage in the Canadian Arctic.

The following ships had weather damage: ATLANTIC EARL, CIUDAD DE MANIZALES, JOHN K., MARGARET CHRISTINA, RIVER HADEJIA, ROVER T., and SARZ.

North Pacific Weather Log

July, August and September 1983

WEATHER LOG, JULY 1983--There were a normal number of extratropical cyclones across the North Pacific. In addition, there were short-lived weak frontal waves that are not shown on the track charts. The primary storm track was northeastward from the southern coast of Japan to near 50°N, 180°. Tracks over the Bering Seas and Gulf of Alaska were dispersed. Most storms dissipated as they neared or crossed coast lines.

The only closed circulation over water on the monthly mean sea-level pressure chart was the 1029-mb Pacific High at 36°N, 155°W (fig. 56). This was 4-mb higher and 300 mi southwest of its normal position. There was a 1007-mb Low north of the Gulf of Shelikhova. Also an anomalous 1016-mb High north of Point Barrow over the Arctic Ocean.

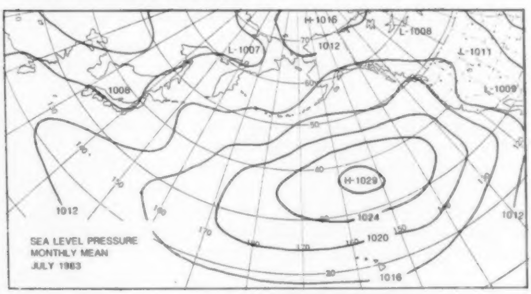


Figure 56.-- Monthly mean sea-level pressure.

The anomaly centers were weak. The deepest was minus 5 mb west of Vancouver Island. There were two plus 3 mb anomaly centers across the central ocean. The High over the Arctic Ocean produced a plus 4-mb center about 300 mi north of Point Barrow.

There were three typhoons over the western ocean, Tip, Vera, and Wayne. There were six tropical cyclones over the eastern ocean; tropical storms Cosme, Dalila, Erick, and Flossie, plus hurricanes Gil and Henriette.

Some Climatology. On July 30, 1965 the temperature at Portland Oregon reached 107°F to equal their all time record high.

Extratropical Cyclones--The month started out with a normal summer time configuration of pressure systems. There was a strong Pacific High with weak LOWs tracking northeastward from Japan into the Bering Sea and Gulf of Alaska.

The first part of the second week the center of the Pacific High moved to near the northern California coast. Several weak low-pressure centers tracked along the primary climatological storm track. In midweek there were a multitude of pressure centers, especially frontal waves. By the end of the week the Pacific High had again built westward. High pressure was moving out of the Sea of Okhotsk.

During the third week the Pacific High built northwestward to near 45°N, 150°W at 1042 mb. There was another high-pressure center over the central ocean and high pressure dominated the ocean except for the tropical latitudes. By the middle of the third week the Pacific High was centered near 43°N, 165°W. Low pressure centers moved into the Bering Sea. At the end of the week the Pacific High was drifting southward.

During the fourth week the strongest LOW of the month moved from the Tsugaru Strait into the Bering Sea. Other Lows were weak. The Pacific High drifted eastward. By the end of the month the Pacific High had flattened along latitude 35°N and had multiple centers. LOW centers moved into the Gulf of Alaska.

Monster of the Month--This frontal wave formed on the 1st, south of Tokyo, near latitude 25°N. Quite far south for the summer. At 0000 on the 2d the CORAL ACE near 37°N, 165°E was about midway between the LOW center and a HIGH to the

Figure 57.-- This high altitude cloud view gives the impression that it could support violent weather at the surface.

northeast with 40-kn easterly winds. Her winds were 45-kn on the 3d. The STREAM DOLPHIN (44°N, 173°E) had 38-kn winds from the southeast at 1200. The PACMERCHANT measured 45-kn easterly winds on the 4th near 50°N, 172°E. Nearby, the SANTA CATALINA MARU measured 30-kn winds with 20-ft swells. A British ship (GHUK) near 32°N, 178°E reported 30-ft swells which seems very high. At 0000 on the 5th the storm was 996 mb near 51°N, 173°E (fig. 57).

On the 6th the OSTROV SCHMIDTA (52°N, 163°W) measured 45-kn southerly winds. The storm was moving eastward causing little trouble. The BARBARA FOSS (59°N, 139°W) measured 41 kn southeasterly winds with 15-ft seas. The storm dissipated on the 10th.

This was the remnant of a June storm that redeveloped. For the first 3 days of the month it was quasistationary near 52°N, 138°W. On the 3d it started a counterclockwise loop. On the 5th it was near 54°N, 140°W. The GLACIER BAY (53°N, 133°W) had 33-kn southeasterly winds with 17-ft seas and 23-ft swells. The KENAI (54°N, 136°W) had 40-kn easterly winds with 10-ft seas and 17-ft swells. These were the only reports of gale-force winds and high waves. The storm had its' one last fling and dissipated by the 7th.

These high winds and waves were not caused by low pressure but by high pressure squeezing against the coastal mountains of North America. There was a LOW to the east but it was on the east slope of the Coastal Mountains. On the 14th the Pacific High built northeastward. The GALVESTON (51°N, 131°W) found 35-kn gales, 13-ft seas, and 21-ft swells. At 0000 on the 15th the HIGH was 1039 mb near 44°N, 146°W. The EASTERN MAID (38°N, 123°W) had 52-kn winds from the northwest with 17-ft waves. The sister ship EASTERN MOON measured 40-kn winds and 17-ft waves about 40 mi to the northwest. To the south near 35°N, 123°W the M.P. GRACE measured only 17 kn from the northwest but the swells were 23 ft.

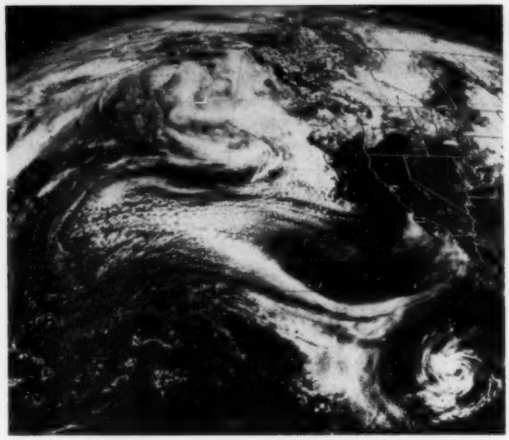


Figure 58.-- This SMS image shows the cloud cover associated with the HIGH. Hurricane Erick is in the lower right corner.

At 0000 on the 16th the HIGH was 1042 mb near 45°N, 150°W (fig. 58). The WMDM (39°N, 125°W) had 40-kn winds from 330° and 15-ft waves. The MARGRETHE MAERSK (37°N, 127°W) found 30-kn winds from 360° with 20-ft waves. At 0000 on the 17th the HIGH was 1040 mb near 45°N, 152°W. The EASTERN MOON (30°N, 118°W) had only 15-kn winds but 26-ft swell from 320° had traveled out of the tight gradient. By the 18th the gradient had relaxed enough that no more gales were being reported.

This storm was born over the Sea of Japan on the 16th. There were a couple of 35-kn gale reports on the 17th. At 0000 on the 18th the 992-mb storm was near 49°N, 161°E. There were several gale reports to the east and southeast of the center. The HOKUSEI MARU (45°N, 170°E) measured 34-kn southerly winds with 23-ft waves. The STAR SINGAPOR (50°N, 175°E) measured 44-kn southeasterly winds with only 8-ft waves.

On the 19th the storm was east of Kamchatka at 990 mb. The JUPITER DIAMOND (48°N, 177°E) measured 42-kn winds from the south and 13-ft waves. The GAMBADA (54°N, 178°E) measured only 27-kn winds from 250° but the swells were 21 ft and they continued into the 20th. The storm weakened rapidly and was no longer of concern.

The Sea of Japan produced this storm on the 20th. It raced along as a frontal wave and at 0000 on the 22d was 996 mb near 41°N, 158°E. The SUNBELT DIXIE measured 40-kn southerly winds east of the center. At 0000 on July 23 the storm was 985 mb near 47°N, 177°E (fig. 59). The SEA-LAND DEVELOPER (44°N, 176°E) had 40-kn winds from the southwest south of the center. A Japanese ship (JFTY) had 45-kn southwest winds and 15-ft waves as the storm moved northwest of their location.

Figure 59.-- A very complicated cloud system. Note that near 48°N, 175°E two layers of clouds cross at 90°.

The storm was over the Bering Sea on the 24th. At 0200 the GALLEON HONOR sent a special observation from 48°N, 177°E reporting 42-ft swell waves. The winds were only 11 kn. The storm was weakening on the 25th and disappeared over the Bering Strait on the 27th.

Casualties--The Taiwan vessel TA YA, No. 2 sank on the 2d in bad weather off northern Taiwan. All the crew was rescued by the PANCHRATNA. The NAM SUNG No. 9 collided with the KINABALU SEBELAS in dense fog on the 20th off Kashima Lighthouse.

The FILIPINAS and MALITAM grounded in Manila Bay during typohoon Vera. The BOB CAT grounded at Tabaco during Vera.

Other Casualties--The JEROME developed a leak in bad weather in the Gulf of Aden. The GOLDEN ENTERPRISE, ITAGIBA, and SHIN HUEI all encountered heavy weather in the vicinity of Durban. The ATLANTIC MARINER collided with a cargo barge at the port of Bushire. The LONTUE suffered surge damage at Lota, Chile due to heavy swell. The NESTOR also suffered damage by contacting barges in heavy weather.

There was bad weather around Australia. The ANNTEAK was missing and sunk. The BRITISH SPIRIT was adrift off the southwest coast. The COOMA capsized off Fremantle when cargo shifted. All crew was rescued. The IRON SHORTLAND was damaged while anchored off Newcastle.

WEATHER LOG, AUGUST 1983--This was a quiet weather month except for tropical cyclones. The cyclones were generally weak and short lived and tended to wander. The main feature they had in common was a southwest to northeast track along the northwest and north rim of the ocean. There was a weak primary track from about 40°N, 160°E into the Bering Sea to Cape Romanzof.

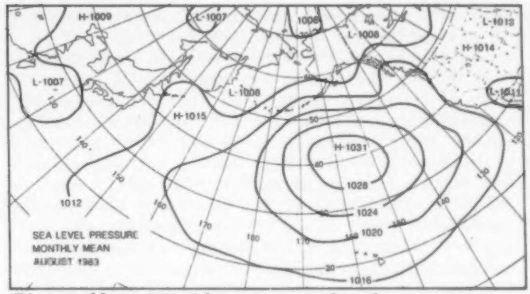


Figure 60.-- Monthly mean sea-level pressure.

The 1031-mb Pacific High was beyond all doubt the primary sea-level pressure feature (fig. 60). It was located near 40°N, 156°W, 6° longitude west of its normal position and 7 mb higher pressure. There was a usual 1008 mb LOW near 54°N, 162°E, about 500 mi southwest of its normal location. There was an anomalous 1015 mb HIGH south of Kamchatka and east of Hokkaido.

The major pressure anomaly center was plus 8 mb near 46°N, 162°W. This large center occupied the ocean between 140°W and 180° and 25° to 60°N. There was a plus 3 mb center associated with the anomalous HIGH and a minus 2 mb center over Kamchatka. The remainder of the ocean was within 2 mb of normal.

At 700 mb the Pacific High was 29 m higher than normal and 200 mi to the north. This produced an abnormal ridge along longitude 160°W. The trough off the North American coast was sharper than normal, as was the trough along longitude 165°E, and farther west.

There were five tropical cyclones over the western ocean; typhoons Abby and Ellen, and tropical storms Ben, Carmen, and Dom. There were three over the eastern ocean; hurricanes Ismal and Kiko, and tropical storm Juliette.

Some Climatology. On August 26, 1883, 100 yrs ago, the Krakatoa volcano exploded in the East Indies. There were spectacular red sunsets across the United States in November and December of that year.

Extratropical Cyclones--There were no spectacular extratropical cyclones this month, even for a summer month. The first week opened with the Pacific High building north of Hawaii. There were weak LOWs and frontal waves of the Asian coast and in the Gulf of Alaska. At the end of the week there was a 1032-mb High near 40°N, 165°W. Typhoon Abby was intensifing.

The second week was a replay of the first week with hurricane Ismael over the eastern ocean.

The third week Abby was at her maximum south of Japan. She was extratropical by the end of the week. The Pacific High was weakening and moving eastward.

The fourth week there were multiple weak pressure centers with a deep LOW over the northwest ocean which quickly degenerated. By the end of the week the Pacific High had built westward and intensified. The last days of the month there were two large LOWs, one over the Bering Sea and another over the Gulf of Alaska.

This first storm was the extratropical extension of typhoon Abby. By the 18th Abby was extratropical over northern Honshu. The GREEN MAYA (35°N, 144°E) had southerly 35-km winds with 23-ft seas. By 0000 on the 19th the storm was 988 mb near 39°N, 144°E. The GOLDEN PRINCE (43°N, 152°E) measured 22-kn easterly winds with 13-ft seas and 23-ft swells. The storm was drifting southeastward on the 20th. The NEPTUNE LEO (32°N, 151°E) had 40-kn southwesterly winds with 28-ft waves. The CHEMICARRY No. 6 reported 48-kn northerly winds. By the 1200 analysis the storm had split into two centers. The eastern one raced eastward then northward as the more intense system. The western center took a leisure trip to the Gulf of Alaska where it finally developed.

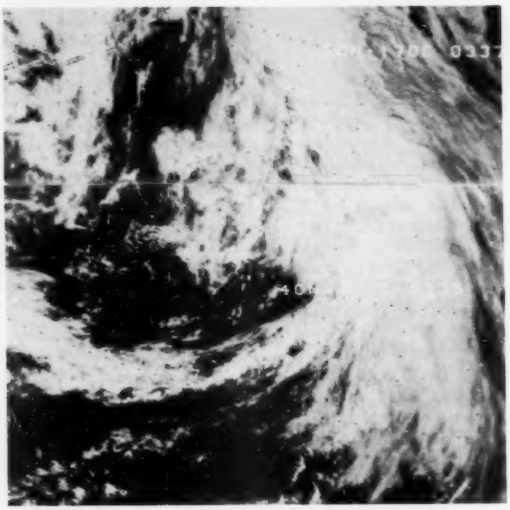


Figure 61.-- Satellite images are a big help in locating weather systems over the oceans, but as in this case surface observations are absolutely necessary to locate the LOW.

On the 21st the eastern LOW was near 40°N, 165°E at 0000 (fig. 61). The CHARLES LYKES (34°N, 166°E) had 30-kn winds and 26-ft waves. The TOWNSEND CROMWELL (41°N, 170°E) measured 44-kn with 20-ft waves. At 0000 on the 22d the storm was 970 mb near 49°N, 165°E. The BUNGA SRIPAGI (48°N, 167°E) measured 48-kn winds from 170° with only 10-ft waves. The JAPAN POPLAR (51°N, 169°E) had 41-kn winds from 150°, 17-ft seas, and 36-ft swells. At 0000 on the 23d her winds were 35 kn from 230°, 17-ft seas, and 33-ft swells. The storm was rapidly deteriorating and no longer existed on the 25th.

This is the western center of extratropical Abby. It lead a leisure life and lived longer. On the 24th the HOHKOKUSAN MARU 36°N, 160°E found 20-ft seas. The storm remained weak but survived and was over the Gulf of Alaska on the 27th. Several ships had gales. The 0000 chart of the 28th showed it had deepened rapidly and

Figure 62.-- There is no doubt where the center of this storm is.

was 984 mb near 54°N, 140°W (fig. 62). The FAIRWEATHER (55°N, 142°W) measured 40-kn northerly winds with 23-ft waves. The BUNGA SRIPAGI, now at 51°N, 141°W estimated the winds as 50 kn. The PORTLAND (57°N, 145°W) had 25-ft swells on the 29th. The storm was moving southeastward off the coast. On the 30th it was 1000 mb near 46°N, 128°W. The HIRATSUKA MARU measured 45-kn winds and 13-ft waves. They were 50-kn on the 31st. The storm disappeared on September 1.

This storm began as a frontal wave in an area of weak gradient near 39°N, 173°E on the 27th as an upper air LOW moved southeastward from Kamchatka, then turned northeastward. The surface LOW intensified quickly under the influence of the upper-air system. The storm was 988 mb near 50°N, 175°E at 1200 on the 28th. The PRESIDENT LINCOLN (49°N, 178°E) measured 40-kn southerly winds with 13-ft seas not far from the center. They were 41-kn with 13-ft seas on the 29th. The EASTERN PACIFIC near 52°N, 168°E measured 48-kn northerly winds. The Chinese BZDN (54°N, 179°E) measure 36-kn southerly winds and 20-ft waves on the 30th. The storm disappeared over the Bering Sea late on the 31st.

The northern Kurile Islands produced this weak LOW beneath an upper-air trough that was rotating around an upper LOW on the 29th. No front was involved. A front did evolve as contrasts developed between northerly and southerly flowing air. The storm was 999 mb at 1200 on the 30th near 42°N, 169°E. The VERMILION HIGHWAY (42°N, 166°E) had 40-kn winds out of the north with 13-ft waves. On the 31st the SEA-LAND ENDURANCE (49°N, 168°E) found only 12-kn winds, 3-ft seas, but 25-ft swells were coming out of the northwest. The SCANDINAVIAN HIGHWAY (42°N, 170°W) had 38-kn gales from the south and 13-ft waves. The storm moved northeastward and dissipated on September 2.

Casualties--Fog was the culprit in most North Pacific casualties. The DASMARINAS and SEIKAN MARU collided off Ohshima. The JUNSHO MARU No. 8 and TAISEI MARU No. 8 collided in Fukuoka Bay. The MONISBON and NICKEL MARU No. 2 collided 60 mi south of Tokyo. The NICKEL MARU capsized and two crewmen were missing.

The AMERICAN MONARCH touched bottom at Johnston Island in strong winds. The PROVIDENCE sank in rainy weather 18 mi southeast of Ketchikan. Three of the crew were killed.

An earthquake hit the northern Philippines on the 17th. Most of the 21 people killed were at Laoag in collapsed buildings. A tsunami struck coastal towns on Luzon's northwest coast.

Other Casualties--The following vessels suffered weather related damage in the South Pacific or Indian Ocean. The ELKA reported encountering heavy weather and freak waves the 18th to 20th while 1,000 mi west of Colombo. The KRAKATAU sank in rough seas off Java. Thirty-eight passengers were missing. The OCEAN ENDURANCE reported weather damage at Abidjan. The RIMAC 10 grounded near Lima, Peru. The SUBIRA sank in high winds and seas off Dar-es-Salaam and eight people drowned.

WEATHER LOG, SEPTEMBER 1983--The stronger extratropical cyclones this month were fairly well concentrated in two primary tracks. One stretched from Honshu to about 43°N, 165°E to near 52°N, 170°W. Another from midocean near 33°N, 170°E extended to 52°N, 170°W. From 52°N, 170°W a secondary track stretched to near Kodiak Island. Another secondary track came out of the eastern ocean into Dixon Entrance. These tracks matched climatology fairly well except for the anomalous one northward from the central ocean.

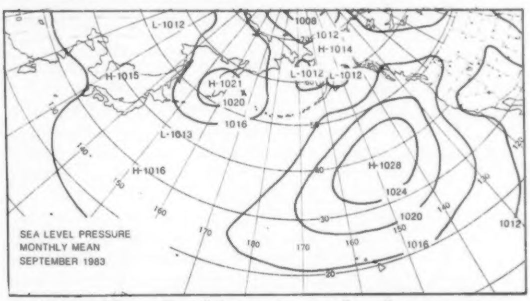


Figure 63.-- Monthly mean sea-level pressure.

The mean sea-level pressure was above normal over the vast majority of the ocean (fig. 63). The prominent 1028 mb Pacific High was near 39°N, 148°W, about 300 mi north and 7 mb higher than normal. There were two small 1012 mb Aleutian LOWs, one over Cook Inlet and the other over Nunivak Island. The normal LOW is 1006 mb over Bristol Bay. There was an abnormal 1021 mb High over southern Kamchatka replacing a normal 1010 mb Low over northern Sakhalin Island.

The two most prominent anomaly centers were a plus 10 mb over Kamchatka and a plus 8 mb center near 44°N, 148°W. There a weak area of negative pressure off California and a minus 3 mb area centered near 40°N, 173°E. As a matter of interest there was a minus 9 mb anomaly center near 80°N, 160°W. The zero isoline paralleled the Siberian and Alaska Arctic shore line.

There were major differences from climatology in the upper-air pattern at 700 mb. There was a major longwave trough that stretched from a Low near 80°N, 160°W southward to west of Nunivak Island, then southwestward to near 28°N, 165°E. There was a shortwave trough off the California Coast. The subtropical High primary center was near 36°N, 153°W, about 280 ft higher than normal and 400 mi to the north.

There were two tropical cyclones over the western ocean, typhoon Forrest and tropical storm Georgia. There were five tropical cyclones over the eastern ocean; hurricanes Lorena, Manuel, and Priscilla, and tropical storms Narda and Octave.

Extratropical Cyclones--The weather was relatively calm except for tropical cyclones the first 3 weeks of the month.

The first half of the first week featured weak pressure centers except for the usual Pacific High. By midweek a High from out of Asia had built creating a high pressure ridge between latitudes 40° and 50°N with centers near 155°W and 165°E. There was a 1038 mb center near 50°N, 180° and a weak LOW over the Gulf of Alaska. By the end of the week the HIGH had moved southeastward creating a tight gradient along the North American coast between the HIGH and a LOW that had moved southeastward.

The controlling Pacific High was normal the second week. There were weak pressure centers over the remainder of the ocean. There was a mild LOW over the Gulf of Alaska in midweek. At the end of the week there were LOWs over the Bering Sea and east of the Tsugaru Strait.

By the middle of the third week the LOW off Japan had intensified over the central ocean. At the end of the week the Pacific High had retreated to British Columbia with two week centers near its normal location (35°N, 155°W). There was low pressure off the California coast, partially the result of the remnants of hurricane Manuel.

The most severe weather occurred the last week of the month. There was a powerful LOW off Japan at midweek. The last of the month another strong LOW developed over the midocean, and extratropical Forrest became a severe storm.

The first high winds and waves of the month were associated with the Pacific High and a small rapidly deepening and intense LOW over the Queen Charlotte Islands. On September 4, the Pacific High was 1034 mb near 41°N, 149°W. There was also a 1037-mb HIGH near 48°N, 168°E. There was an east-west trough over the south coast of Alaska. At 1800 the CHEVRON CALIFORNIA (57°N, 141°W) measured 45-kn westerly winds with 10-ft waves. The MOBILOIL (40°N, 125°W) had northerly 55-kn winds with 23-ft waves. On the 0000 chart of the 5th a frontal wave had formed north of and between the two HIGHs. It raced eastward to the Canadian Coast on the 6th (fig. 64).

The following description of the encounter

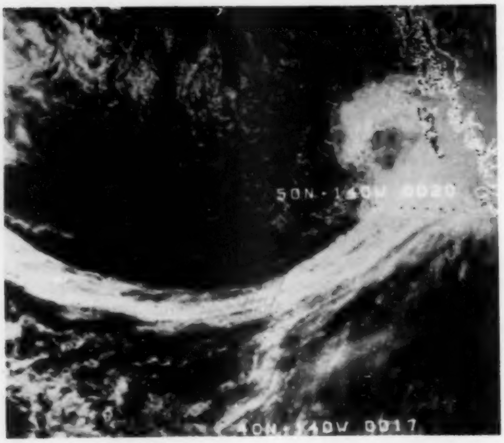


Figure 64.-- This how the storm would have looked to Capt. Dalton if he had been aboard the satellite rather than the EXXON HOUSTON.

with this storm by the EXXON HOUSTON was sent by Captain Craig N. Dalton.

Dear Sir:

On the night of 5 Sept. 1983, this vessel did encounter hurricane force winds and heavy seas and was forced to slow down to prevent possible structural damage. The following are the order of events for that night:

All times are ZD +7

1905 In approximate position L53-OON Long 135-49W. Wind from SW at 10 kn.

1910 Wind veered suddenly to NW up to 70 kn immediately.

1912 Experienced sustained winds of 80 kn with gusts to 94 kn. Sea blown down flat. Wind then veered slightly to NNW.

1913 Barometer, which had been falling quite rapidly since early morning, bottomed out in a rapid drop to 988.5 mb.

1918 Winds had decreased slightly to steady 70 kn.

1928 Winds veered to Nly at 70 kn.

1935 Winds decreased slightly to 60 kn, seas started to build from NNW.

2015-2045 Sustained winds of 50 kn with gusts to 60 kn.

2107 Slowed to 80 RPM due to rapidly building NWly swells of 15-20 ft.

2300 Seas continued to build 20-25 ft.

2400 Seas started to diminish.

The big surprise to all, was the rapid intensification of this low, and the extremely high winds involved, which were totally unpredicted by forecasters. We sent a weather message to METEO VANCOUVER telling them of the present conditions, but these were never reflected in later maps or reports. I have enclosed a copy of our barograph (figs. 65 and 66).

I hope these might be of service to you or the Weather Log.

Sincerely,
Craig N. Dalton
Master

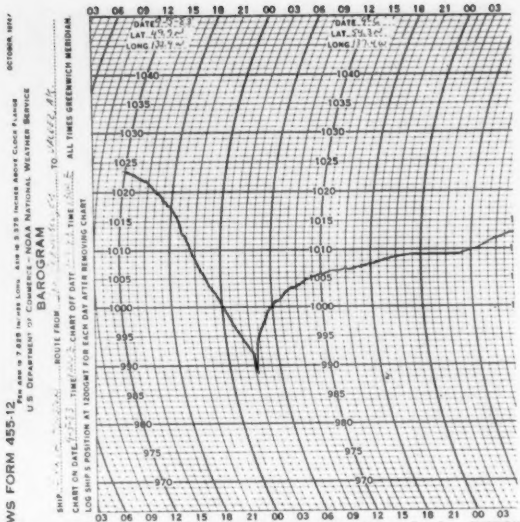
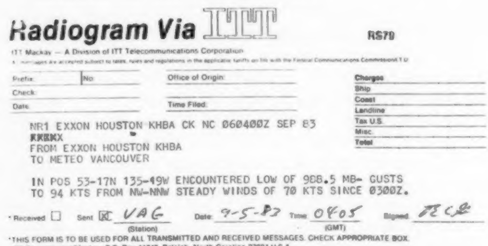


Figure 65.-- The barograph trace aboard the EXXON HOUSTON on the 5th and 6th.



Radiogram Via ITT RS70

ITT Mackay — A Division of ITT Telecommunications Corporation

Prefix: No: Office of Origin:

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NR1 EXXON HOUSTON KHBA CK NC 060400Z SEP 83
KKEKX
FROM EXXON HOUSTON KHBA
TO METEO VANCOUVER

IN POS 53-17N 135-49W ENCOUNTERED LOW OF 988.5 MB- GUSTS
TO 94 KTS FROM NW-NNW STEADY WINDS OF 70 KTS SINCE 0300Z.

*Received ☐ Sent ☒ VAG (Station) Date 9-5-83 Time 0405 (GMT) Signed

*THIS FORM IS TO BE USED FOR ALL TRANSMITTED AND RECEIVED MESSAGES. CHECK APPROPRIATE BOX.
ITT Transmission/Mackay, P.O. Box 11248, Raleigh, North Carolina 27604 U.S.A.

Figure 66.-- The radio message sent to METEO VANCOUVER.

The ALETTA (56°N, 148°W) measured only 21-kn winds but reported 33-ft swells at 0600 on the 5th. At 1800 the PRESIDENT MCKINLEY (39°N, 126°W) found 45-kn northerly winds and 12-ft waves. The winds continued into the 6th. The high pressure had consolidated into one 1034-mb center near 52°N, 165°W. The LOW dissipated over the mountains on the 7th.

On the 7th the HIGH was moving rapidly southeastward. The EXXON NEW ORLEANS (40°N, 125°W) measured 45-kn northerly winds with 12-ft waves. The EASTERN MOON (39°N, 124°W) measured 55-kn northerly winds and 13-ft waves on the 8th. By the 9th the gradient along the coast had weakened.

This was a long-lived storm especially for an early fall month. It came out of China over the Yellow Sea on the 8th. It traveled to Alaska to dissipate on the 22d. The storm was over the Tsugaru Strait on the 12th. At 1200 on the 14th the storm was 984-mb near 45°N, 159°E. The MAIN EXPRESS (42°N, 153°E) measured 51-kn westerly winds with 17-ft seas. At 1800 the ARCTIC TOKYO (49°N, 159°E) measured 45-kn winds from the northeast. On the 15th, several ships had gales up to 40-kn and there were two reports of 23-ft waves north of the center. The ALASKAN MAIL (51°N, 166°E) found 40-kn northeasterly winds on the 16th.

Figure 67.-- The stronger winds were found north and east of the center of this storm.

The storm was 986 mb near 49°N, 178°E at 0000 on the 17th (fig. 67). The VAN CONQUEROR (54°N, 180°) measured 55-kn easterly winds which increased to 66-kn with 13-ft seas on the 18th. The JAPAN APOLLO (43°N, 177°E) found 20-ft swells on the 17th. The DISCOVERER (54°N, 158°W) measured 42-kn easterly winds and 20-ft seas on the 18th. The ALEUTIAN DEVELOPER (55°N, 162°W) measured 56-kn winds from the east with 15-ft seas and 17-ft swells. The storm had filled to 992-mb by 0000 on the 19th but still had a large circulation. The KWLR (59°N, 140°W) reported 51-kn easterly winds and 12-ft waves. The PRESIDENT GRANT (52°N, 153°W) had 45-kn southerly winds and 20-ft waves. On the 20th the UNITED SPIRIT (54°N, 151°W) found 42-kn winds, 18-ft seas and 25-ft swells.

The storm was very weak on the 21st except east of the front as it pressed against a stubborn 1034 mb anomalous cell of the Pacific High. The HOHSING BREEZE (50°N, 147°W) was caught in this tight gradient with 42-kn winds and 25-ft seas and swells. The storm disappeared over the Yukon on the 22d.

This incipient storm was first analyzed on the 0000 chart of the 22d off Tokyo. It intensified rapidly over the warm Kuroshio Current. It was 996 mb at 0000 of the 23d. Several ships had gale to storm force winds with waves up to 25 ft. At 0000 on the 24th the storm was 972 mb near 43°N, 164°E (fig. 68). There were many strong winds and high waves in all quadrants. The CORNUCOPIA (44°N, 162°E) had 52-kn east winds, 18-ft seas, and 25-ft swells. The Soviet ship UOYB (42°N, 163°E) measured 45-kn southwest winds and 33-ft swells.

The storm had turned northward and slowed on the 24th but turned back eastward by the 25th and picked up speed again and weakened. On the 25th and 26th there were a few gale reports. On the 27th the storm was only 990 mb over the Bering Sea. The TA PENG No. 2 was far to the southwest (42°N, 163°E) with 44-ft swells out of the west, probably propagated from typhoon Forrest over Japan. On the 28th, a ship (PGDW) at 39°N, 165°W also had light winds with 36-ft swells from the west as the storm dissipated.

Figure 68.-- Many winter storms are no more severe than this one.

As the storm above was dissipating a new surface LOW was analyzed near 38°N, 172°E on the 0000 chart of the 28th. It was triggered by an upper-air trough moving around the major LOW. At 0600 the GLORIOUS ACE (37°N, 180°) had 38-kn southerly winds and the British ship VRJJ (38°N, 175°E) found 44-kn westerly winds and 16-ft seas.

By 0000 of the 29th the storm was 972 mb near 48°N, 174°W. There were quite a few storm-force wind reports and three near 60-kn. The KYOKUSHO MARU (45°N, 172°W) measured 61-kn southerly winds and 26-ft waves. The other two were the SAMRAT ASHOK (42°N, 173°W) and the IKAN KERISI (54°N, 175°W). The PIONEER No. 3 (39°N, 166°W) had 33-ft waves. Cold Bay Alaska measured 72 mi/hr winds. On the 30th the storm was near Cape Romanzof at 962 mb. The winds were gales. The ALEUTIAN DEVELOPER (55°N, 158°W) had 42-kn southerly winds and 28-ft waves. On October 1 the storm was north of the Bering Strait.

This storm was the extratropical continuation of typhoon Forrest. By 0000 on September 29 Forrest was extratropical near 35°N, 145°E. Two ships near 35°N, 153°E had 50-kn winds and 13-ft seas. One was the HOEGH CAIRN. By 0000 on the 30th the storm was 968 mb near 41°N, 169°E (fig. 69). There were many strong winds this day. The VRJJ (36°N, 166°E) measured 48-kn winds with 36-ft seas. The SEA-LAND VOYAGER also near 36°N, 166°E measured 50-kn winds with 25-ft seas, and 28-ft swells. The PACBARONESS (42°N, 174°E) measured 47-kn easterly winds with 18-ft waves. On October 1 the storm was 974 mb near 49°N, 177°W. The DAIHO MARU (44°N, 176°E) had 54-kn out of the northwest with 23-ft waves. The SHIMA MARU (47°N, 178°E) had 53 kn northwesterly winds. The YUKO MARU (49°N, 178°W) measured only 38-kn winds but

Figure 69.-- The low clouds indicate there may have been some kind of wave near 38°N, 165°E.

the swell was 33-ft. On October 2, a ship near 52°N, 167°W had 48-kn winds from the northwest but the 33-ft swell was still out of the southwest. Several other ships had gales. The NICHIBU MARU (51°N, 168°W) also measured 38-kn winds with 33-ft swells from the northwest at 0600. At 1200 buoy 46003 measured 25-ft waves as the storm was over Kodiak. The storm was 990 mb as it moved along the southwest of Alaska on the 3d. Buoy 46001 also measured 25-ft waves in approximately the same relative position to the center as 46003 earlier. The GLACIER BAY (55°N, 136°W) had 40-kn winds and 23-ft waves. The storm stalled near 57°N, 140°W on the 4th and gradually dissipated.

Casualties--The tanker BROOKLYN departed Valdez September 3 and reported heavy weather damage on the 4th. The GULF BEAUFORT encountered ice and suffered damage in the Beaufort Sea. The MARATHA MARINER encountered heavy weather on the 24th enroute to Japan. The EASTSUN LOYAL ran aground off Sanbonmatsu Lighthouse during typhoon Forrest. The GRAND NAVIGATOR reported it sustained weather damage on the 8th and 9th.

Other Casualties--The ARTHUR PHILLIP sustained heavy weather damage enroute to Sydney. The barge VATSY 2 had weather damage off Madagascar. The KESTREL had weather damage on the 10th off Kenya.

The drilling platform KEY BISCAYNE sank 5 mi off the west Australian coast 75 mi north of Perth in 30-ft waves on September 1.

Hurricane Alley

Dick DeAngelis
National Environmental Satellite Data and Information Service
Washington, D.C.

THE BARQUE HOPE CHRONICLE

From Captain W. E. Williams of North Wales comes an account of the HOPE's encounter in August of 1887 with a North Atlantic hurricane. The account was written by Ada Williams, daughter of the master -- Captain John Williams.

The ship actually encountered two North Atlantic hurricanes. On the 14th squalls from hurricane No. 4 reached gale force and seas were mountainous. The upper main top sail was ripped to shreds before it could be secured. The storm's center was about 200 mi north of the ship. It outraced the vessel the following day. The HOPE headed west northwestward and the weather was fine, until the 19th when hurricane No. 5 closed in on the vessel (fig. 70). Conditions temporarily improved on the 20th as the storm passed the ship. However, the HOPE turned northward on the 22d and cut off the now slowly recurving hurricane -- a move that threatened the ships' safety as told in this edited narrative.

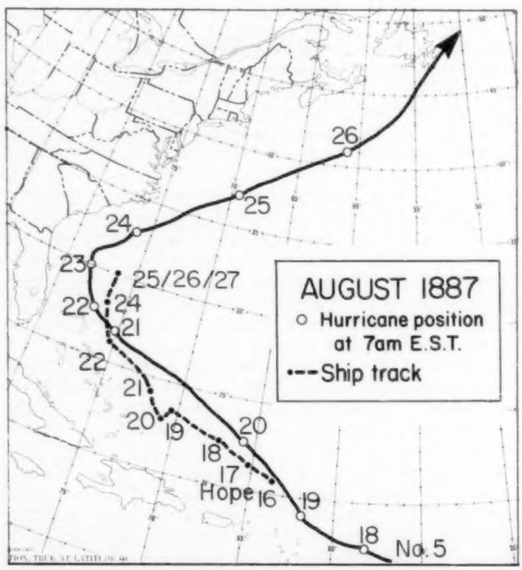


Figure 70.-- The track of tropical cyclone no. 5 and the barque HOPE during August 1887.

Friday, August 19, 1887

Early morning,wind backing to northward and increasing to whole gale. At 6 a.m. we took in topsail and mainsail under reefed topsail and foresail. Wind increasing and gradually backing to westward. Much spray passing over ship. At midnight winds out of northwest occasionally reaching force 10 and rain heavy.

Saturday, August 20

Squalls with violent gusts and heavy rain showers continue as winds back to southwest. The glass is steady at 998.9 mb. At noon we set reefed main topsail as winds become unsteady. High seas in from south. Winds south southwesterly and strong at 8 p.m.; set foresail. At midnight strong winds backing to southeastward.

Sunday, August 21

4 p.m.: Heavy squalls accompanied by heavy showers of rain throughout the day, wind south, barometer 995.6 mb. At 6 p.m. set main topsail; full wind backing to southeast with glass gradually rising -- midnight, 1004.1 mb.

Monday, August 22

Wind moderating and gradually falling to fresh gale. At 8 a.m. set main topgallant sail; at noon took in main topgallant sail -- barometer fell to 998.9 and continuing to fall. Whole gale -- frightful squalls at times. 11:30 p.m. -- call all hands to heave to; the ship is on starboard tack as we are not able to steer. Tried to take in lower main topsail but wind has blown it to ribbons. We put best tarpaulin in rigging as ship is laying over very much and gale increasing from southeast.

Tuesday, August 23

4 a.m. -- ship laying with nothing but tarpaulin in the mizzen rigging. Pumps constant but water gaining slightly and washing over port side ballast. Barometer 965.8 mb and falling, gales increase steadily. At 10 a.m. it is decided to lower weather anchor (starboard) to help keep ship up to the wind and head the sea from the southeast -- which is tremendous -- and also to help keep her upright. Now barometer 951.6 mb, gales increasing, port side ballast is now mud washing up between deck beams as ship falls between seas. Barometer 1 p.m. 939.7 mb. Pumps constantly running and hands bailing out with buckets. Water is gaining fast in spite of everything we can do. At 2 p.m. storm is full hurricane force, glass at 921.8 mb. Impossible to understand the force of the wind and the wretched appearance of everything except for those experiencing it. We are utterably unable to do anything more than to try and keep the pumps running. If this continues much longer the ship must turn over. Port ballast is mud and half the starboard ballast washed into water, which is 5 feet deep in lee bilge. 3 p.m. -- barometer 921.1 mb. Water has torn bilge covers so it has a free hold everywhere. At 3:30 p.m. glass has been steady since 2 p.m. so storm must be at full height; pumping and bailing all the time without easing and raining very hard. 4 p.m. -- in the last 10 minutes wind has gone and now dead calm, all water and ballast to starboard. At 5 p.m. ship listing 45 degrees; light breeze springing up from east backing gradually to north and sky appearing very ugly. Time 8 p.m.: wind northwest and increasing to hurricane force again. By 10 p.m. glass is rising wind blowing harder than ever, driving ballast to port. Midnight: barometer 948.2 mb and rising fast -- wind blowing something fearful.

Wednesday, August 24

At 4 a.m. wind slacking off and sky clearing --barometer 961.7 mb and rising. In daylight ship has heavy list to starboard, strong breeze with heavy cross swell from northwest and southeast. Ship rolling and straining as mud and water washes from side to side. Starboard pump brass chamber cracked so hands kept busy bailing out. The only atternative now is to cut away the masts for preservation of life and ship as ship has a fearful list to starboard. Mud and water washing up to the tween deck as ship rolls. At 3 p.m. strong breeze gradually falling away, but ship still making water rapidly. Cut away fore topmast, main topgallant mast and mizzen topmast with all attached. Ship greatly relieved but still heavy list. By 6 p.m. barometer 998.9 mb, very little wind but still heavy cross swells. Midnight: wind gone but bailing out all the time.

Thursday, August 25

Daylight -- water in hold has not gained much over night. Heavy swell still running. By 7 p.m. got water down to 1 foot above remainder of ballast. Port side pump finally moved to starboard and working.

Friday, August 26

Ship pumped out dry as possible. Light airs from east made sailing possible after which the men were called to heave in the anchor to the boat. They refused to do so on the plea of being too weak after all the pumping and bailing day and night for the last several days. They agreed to heave in to the 15th shackle to slip it. Today was the first day good enough to look around. Found that all the oakum is out of seams from gunwale to copper, right round. Under the stern all joints of planks entirely apart leaving all the rudder trunking clean adrift, daylight streaming right through on the poop. All the after part of the poop, both deck gunwale hatches and gear quite adrift; one sea striking the rudder entirely disabled the steering gear. Light air and fine weather continues.

Saturday, August 27

8 a.m. -- ship under weigh with the number of sails that are left. Vessel sighted on port bow. The crew came aft and wanted the ensign to be put as a signal of distress, feeling that the HOPE is unseaworthy after losing most of her ballast. The AGRA of Christiania, Norway came to assist. The crew and their effects were put on board the AGRA. The position of the HOPE when left was 29.58°N, 76.50°W.

TROPICAL CYCLONE SUMMARY

The tropical cyclone tracks (figs. 71 to 72) and the summaries are based upon information provided by Ted Tsui of the Naval Environmental Prediction Research Facility, the Joint Typhoon Warning Center, the Royal Observatory, Hong Kong, the Eastern North Pacific Hurricane Center, the Central Pacific Hurricane Center and the North Atlantic Hurricane Center. Detailed summaries for North Atlantic tropical

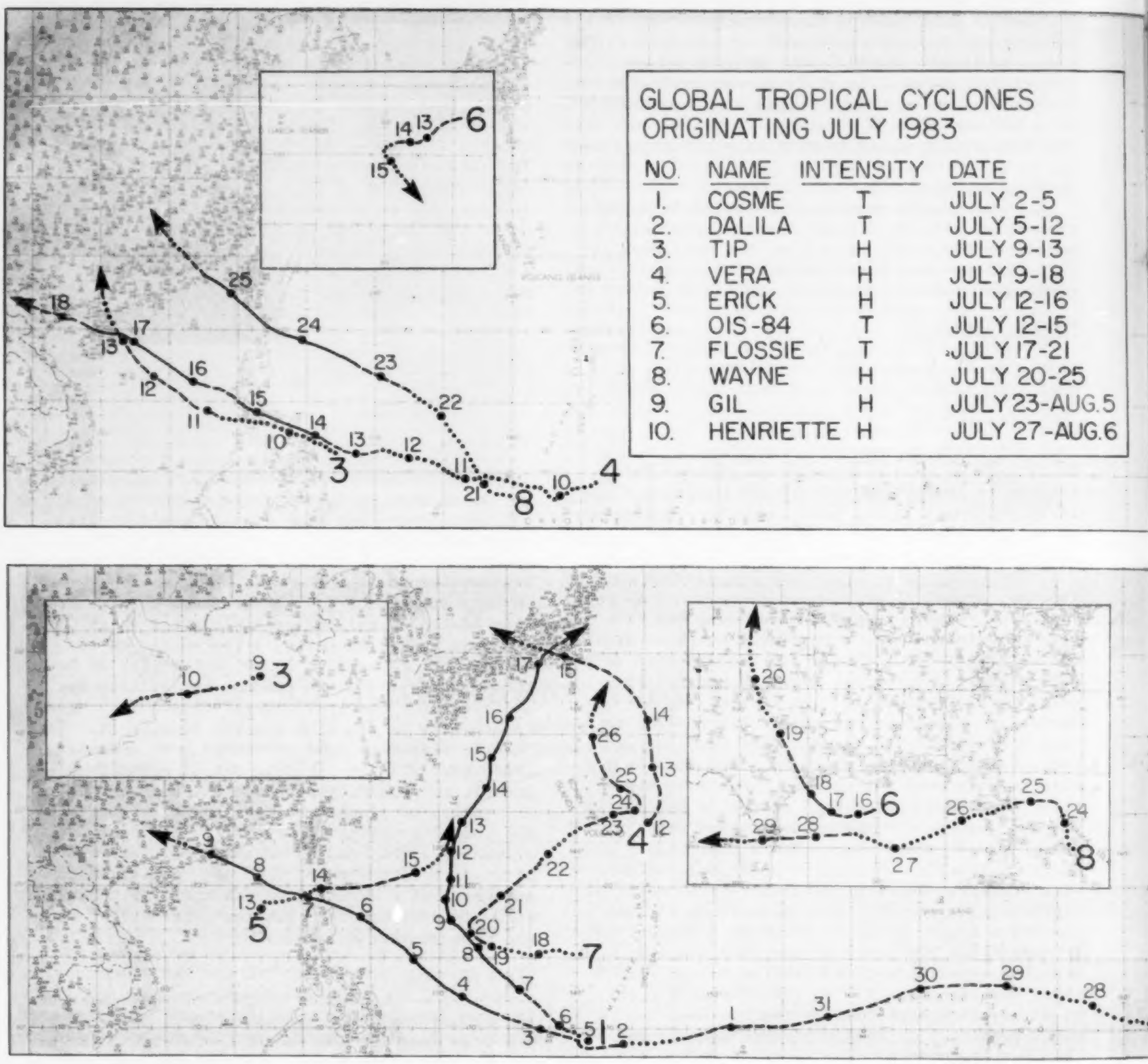


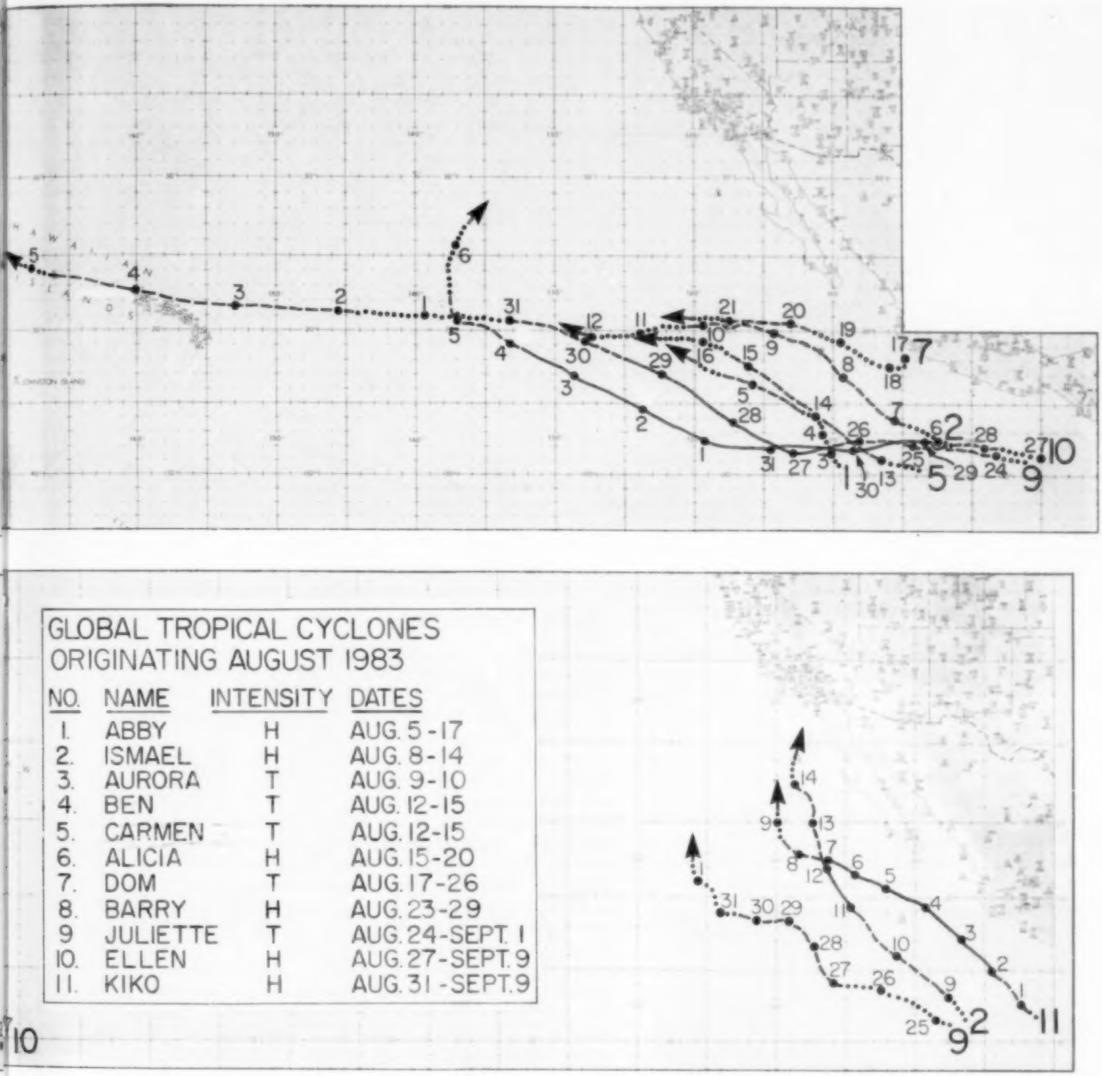
Figure 71.-- Tropical cyclone tracks for July and August, 1983.

cyclones may be found in the annual article on page 10 of this issue.

TROPICAL CYCLONES--JULY 1983

World-wide activity was above normal for this month thanks in large part to the development of six eastern North Pacific tropical cyclones. This compensated for the below normal activity in the western part of that ocean. A maverick South Indian Ocean tropical storm accounted for the remainder of the months statistics table 5.

Tip developed southeast of Manila on the 9th but intensified in the South China Sea after crossing the Philippines. On the 11th the STENAOCEANICA encountered 50-kn winds about 40 mi northwest of the center. Tip was most intense on the evening of the 11th when a reconnaissance aircraft reported 70-kn winds and a surface pressure of 977 mb. The following day Tip passed about 50 mi northeast of Xisha where sustained winds of 48 kn and a 999.3-mb pressure were recorded. Vera meanwhile was developing in the Philippine Sea. She swept across the Philippines on the 14th, generating 80-kn winds near her center. The storm passed 10 mi southwest of Manila, on the 15th, where



sustained winds reached 52 kn with a 990.2-mb pressure. The MALITAM (fig. 73) ran aground in Manila Bay as did the MONARCH, BADJAO, LUZON and FILIPINAS. At the Manila breakwater the tugs JUGHEAD and GRAYLING grounded. At TABACO the BOBCAT and DONWILLY were drived aground. The American container vessel AMERICAN SPARTAN grounded at Subic and was refloated on the 20th. The DON SALVADOR III and the LUMBERJACK collided at Limay. According to press reports Vera was responsible for 106 deaths in the Philippines with 138 people missing. Most of the fatalities were on the Bataan Peninsula on the west shore of Manila Bay, where huge waves wiped out coastal villages. Total damage was estimated at $9 million.

After weakening, Vera reintensified over the South China Sea. Early on the 17th maximum winds were estimated at 90 kn before Vera plowed into Hainan. She passed about 30 mi south of Haikou where a 975.5-mb pressure was recorded. The storm moved ashore and spread much needed rain over several areas of Vietnam on the 18th. The only other western North Pacific storm was typhoon Wayne whose winds reached 135 kn on the 24th as he moved into the Bashi Channel; central pressure fell to 921 mb. That same day the NEDLLOYD FRANKLIN reported winds of 36 kn some 90 mi south of the center. On the 25th the typhoon landed about 30 mi southwest of Xiamen

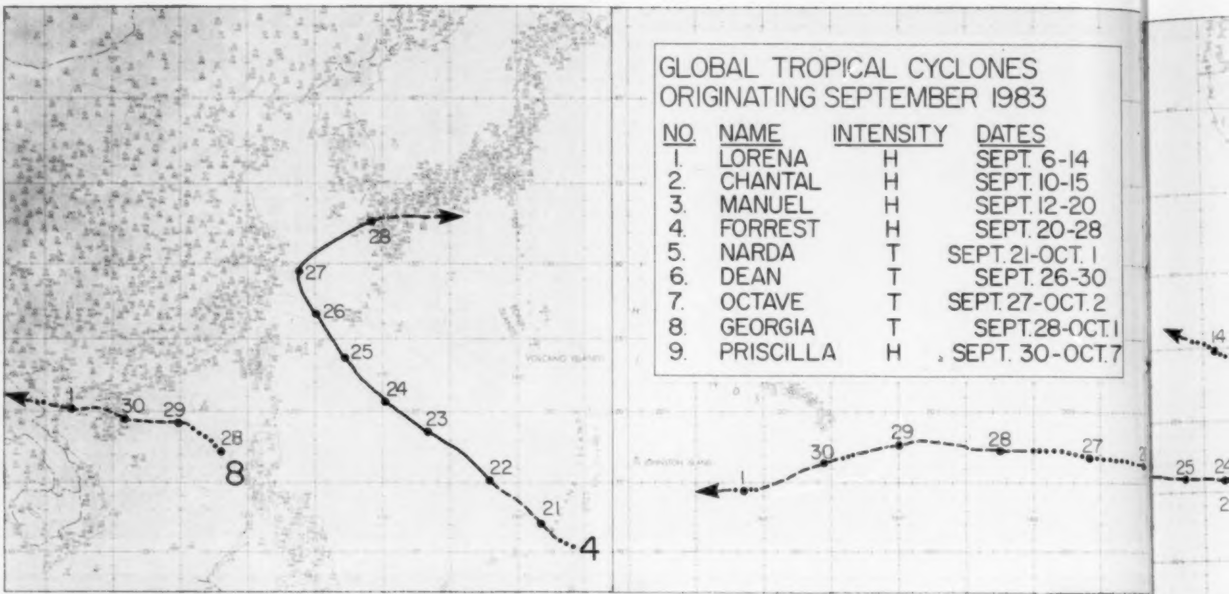


Figure 72.-- Tropical cyclone tracks for September, 1983.

Table 5.--Global tropical cyclone summary July, August, and September 1983

No.	Name	Est. max. wind (kn)	Basin	Dates
		July 1983		
1.	Cosme	35	Ern. N. Pacific	2-5
2.	Dalila	60	Ern. N. Pacific	6-12
3.	Tip	70	Wrn. N. Pacific	9-13
4.	Vera	90	Wrn. N. Pacific	9-18
5.	Erick	55	Ern. N. Pacific	12-16
6.	01S-84	45	S. Indian	12-15
7.	Flossie	50	Ern. N. Pacific	17-21
8.	Wayne	135	Wrn. N. Pacific	20-25
9.	Gil	80	Ern. N. Pacific	23-Aug. 5
10.	Henrietta	115	Ern. N. Pacific	27-Aug. 6
		August 1983		
1.	Abby	145	Wrn. N. Pacific	5-17
2.	Ismael	85	Ern. N. Pacific	8-14
3.	Aurora	45	N. Indian	9-10
4.	Ben	50	Wrn. N. Pacific	12-15
5.	Carmen	45	Wrn. N. Pacific	12-15
6.	Alicia	100	N. Atlantic	15-20
7.	Dom	55	Wrn. N. Pacific	17-26
8.	Barry	70	N. Atlantic	23-29
9.	Juliette	50	Ern. N. Pacific	24-Sept. 1
10.	Ellen	125	Wrn. N. Pacific	27-Sept. 9
11.	Kiko	125	Ern. N. Pacific	31-Sept. 9
		September 1983		
1.	Lorena	100	Ern. N. Pacific	6-14
2.	Chantal	65	N. Atlantic	10-15
3.	Manuel	100	Ern. N. Pacific	12-20
4.	Forrest	150	Wrn. N. Pacific	20-28
5.	Narda	50	Ern. N. Pacific	21-Oct. 1
6.	Dean	55	N. Atlantic	26-30
7.	Octave	45	Ern. N. Pacific	27-Oct. 2
8.	Georgia	55	Wrn. N. Pacific	28-Oct. 1
9.	Priscilla	100	Ern. N. Pacific	30-Oct. 7

on the China coast. Thunderstorms and heavy rain caused severe flooding in Fujian and Guangdong. According to press reports a total of 105 people were killed, 440 were injured and some 30 thousand houses collapsed.

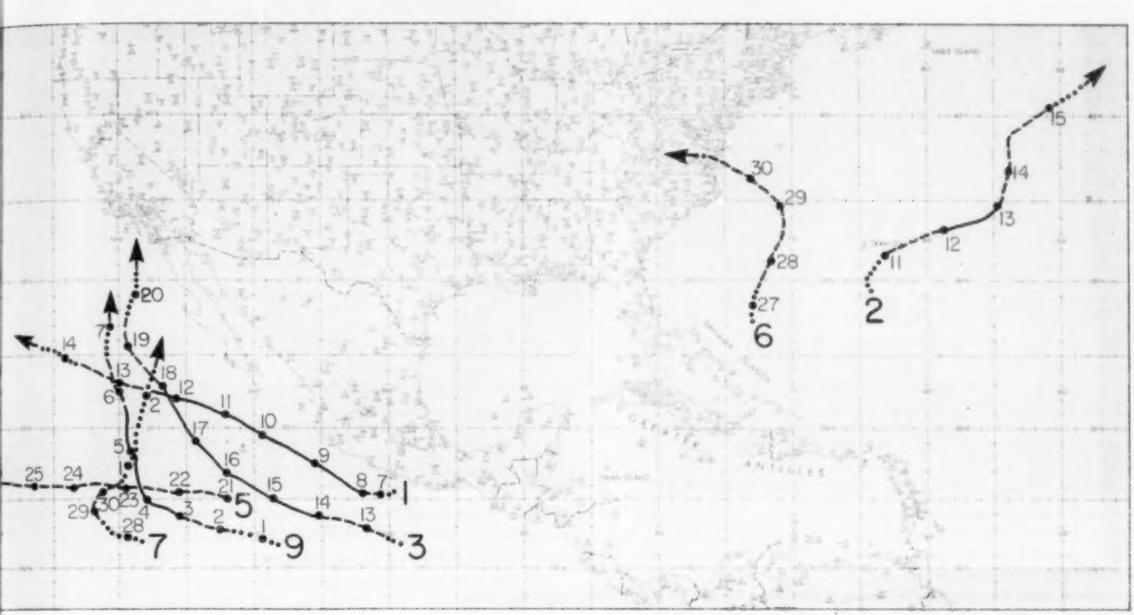
In the eastern North Pacific two of the six tropical cyclones reached hurricane strength -- Gil and Henriette. Both these late month storms originated in the same area within 4 days of one another. Both traveled a similar path until about 135°W, where Gil continued westward toward the Hawaiian Islands while Henriette recurved northward and weakened. Her maximum winds had reached 115 kn on the 31st while Gil's had climbed to 80 kn in the same area on the 27th. On the 1st Gil moved into the Central Pacific region as a tropical depression after weakening over the cooler waters between 120°W and 140°W. Moving westward he slowly regained his strength. Maximum winds near the center reached 40 kn as Gil approached Kauai and Oahu where winds remained light. There was little or no damage as a result of Gil's passage. A few heavy showers occurred mainly over Kauai and heavy surf pounded the east and northeast shores of the two islands.

The South Indian Ocean storm was unusual for this time of the year. Since 1965 only one other tropical cyclone developed in July in this basin.

TROPICAL CYCLONES--AUGUST 1983

This was the most active of the 3 mo as eleven tropical cyclones developed across the northern hemisphere; six of these reached hurricane intensity including the two in the North Atlantic.

The worst storm was typhoon Abby which developed in the Philippine Sea and moved northward to Japan. Her maximum winds reached 145 kn on the 8th and 9th and she remained at super-typhoon strength (130 kn or more) most of those



two days. The LNG ARIES, built in 1977, sustained minor damage from the storm a few days later. Abby approached Japan on the 16th, causing a suspension of unloading operations at Kobe, Osaka, Nagoya and other ports in central Japan. Two days prior to Abby's arrival tropical storm Ben moved across Honshu bringing strong winds and torrential rains. Abby dumped more than 36 in. of rain over ports on Honshu, triggering numerous floods and landslides. From the two storms it was estimated that about 50 people died, mostly by drowning. Late in the month typhoon Ellen developed east of 180 and made a long trek across the Pacific that took 2 weeks.

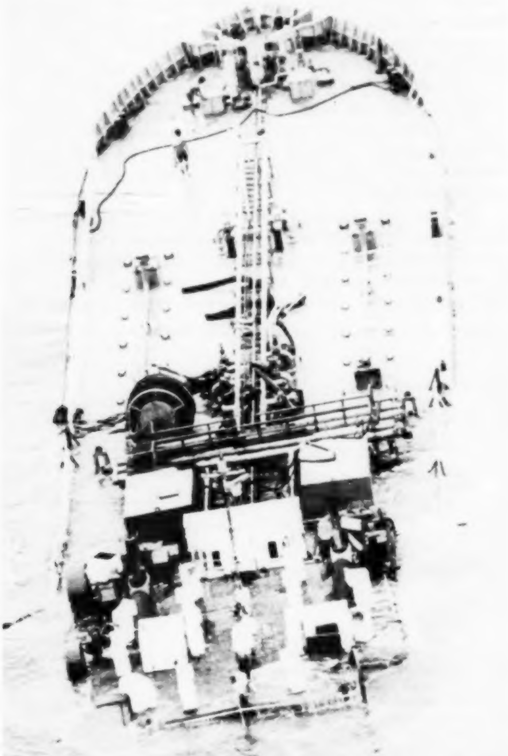


Figure 73.-- The tanker MALITAM lies in the shallow waters of Manila Bay after running aground at the height of typhoon Vera. Wide World Photo.

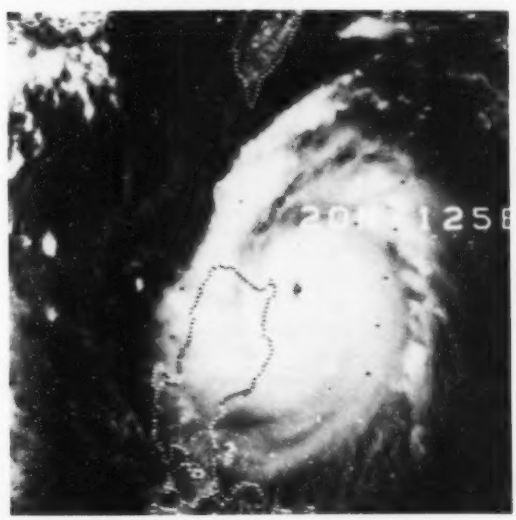


Figure 74.-- Typhoon Ellen is approaching the Balintang Channel on the 6th.

Typhoon Ellen did not reach typhoon strength until September 3. She continued to intensify as she moved west northwestward through the Philippine Sea toward the Balintang Channel. On the 6th winds were estimated at 125 kn near her 928-mb center (fig. 74). Off the Philippines several Taiwanese fishing boats capsized and 21 crewmen lost their lives. Ellen weakened in the Balintang Channel; on the 7th a reconnaissance aircraft reported a 966-mb pressure; surface winds were estimated at 80-85 kn. Ellen passed about 15 mi southwest of Dongsha on the morning of the 8th. Two fishing junks capsized and thirteen others went aground. Of the crewmen 146 were accounted for while 46 were missing. Late on the 8th the FRANKFURT EXPRESS reported a 52-kn wind about 80 mi northeast of the center. Ellen came closest to Hong Kong on the morning of the 9th when her center passed about 7 mi off the southwestern tip of Lantau Island. Her eye was over Macau for about 25 min and winds there dropped to 15 kn. Maximum winds of 52 kn with a minimum sea level pressure of 970 mb were recorded at Macau. Some 16 people lost their lives and about 50 sampans and junks capsized. Ellen then moved into Guangdong causing heavy damage to eight counties in that province. At total of 16 people were killed with 16 others missing in Zhuhai, Shenzhen and Panyu. The water level of Zhu Jiang near Guangzhou rose to 2.42 m, the highest since 1942.

At the height of the typhoon 27 ships totalling 185 thousand tons ran aground, mainly in north Lantao and the Kau Yi Chau area. The stern of the Singapore freighter GOLDEN FORTUNE one of five ships aground at Kau Ti Chan was partly awash. The 442-ton cargo ship CITY OF LOBITO same close to slamming into a modern beachside apartment complex on Tung Wan, Cheung Chau. The PACIFIC CORAL was stranded on a bank off northern Lantao while the container ship ZIM MANILA II crunched high on the rocks at Hei Ling Chau. Ellen's toll on shipping, in terms of numbers, reached those of typhoon Rose in 1971 and typhoon Wanda in 1962. Table 6 compares Ellen with some

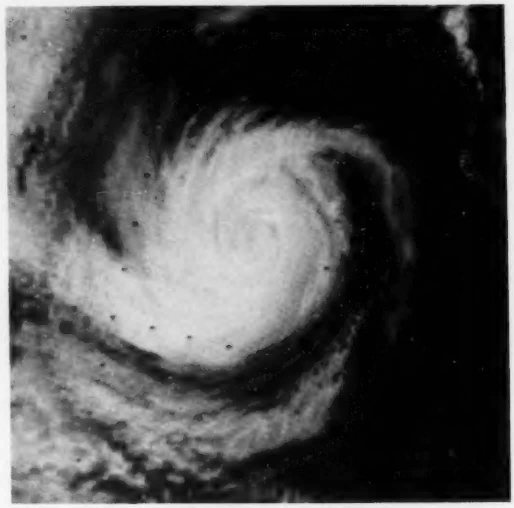


Figure 75.-- Heading west-northwestward Kiko is still a hurricane on September 6.

major typhoons affecting Hong Kong.

Of the three eastern North Pacific tropical cyclones, Ismael and Kiko reached hurricane strength. While they formed more than 3 weeks apart both traveled a similar course. Ismael's winds climbed to 85 kn on the 11th after he crossed the 20th parallel. Kiko was much stronger (fig. 75). After reaching hurricane intensity late on September 1, he developed explosively and maximum winds jumped to 125 kn near his center on the 3d. However, Kiko was on a northwesterly track that was taking him over cooler water and on the 7th he fell to tropical storm strength.

On the 9th Aurora came to life in the Arabian Sea. The short-lived system reached tropical storm strength that same day. Generating 45-kn winds Aurora crossed the coast of Oman the following day. It was reported that a total of

Table 6.-- A comparison of typhoon Ellen with a few other major typhoons.

	Maximum wind speeds in knots				Duration in hours of		Rainfall in mm	Storm surge in metres	
					Gales	Hurricane force winds			
Stations / Typhoons	Royal Observatory	Hong Kong Airport	Waglan Island	Cheung Chau	Waglan Island		Royal Observatory	Tai Po Kau	Chi Ma Wan
Wanda 1962	72(140)	58(123)	80(117)	64(125)	14	1	262.8(31 Aug-2 Sep)	3.2	- *
Rose 1971	55(121)	66(114)	76(102)	71(105)	15	3	340.9(16-17 Aug)	1.0	1.2
Hope 1979	40(94)	62(98)	78(107)	63(100)	6	2	287.4(2-4 Aug)	3.2	1.5
Ellen 1983	50(100)	60(110)	91(122)	92(128)	18	8	231.8(8-10 Sep)	1.7	1.8
Remarks	Maximum 60-minute mean winds with maximum gust peak speed in brackets				Due to the exposure of the anemometer at Waglan Island, hourly mean winds of ⩾39 and ⩾68 knots are taken to be equivalent to gales and hurricane force winds near sea level respectively. (Ref: R.O.Tech.Note No.45)		Rainfall directly attributable to the typhoon	* no records	

30 local fishing boats were lost at sea.

TROPICAL CYCLONES--SEPTEMBER 1983

Of the nine tropical cyclones to develop this month only two came to life in the western North Pacific -- a basin that averages five. Activity in the eastern portion, however, was above normal but with North Atlantic development slightly below normal, the month in general was slack.

The most potent storm was typhoon Forrest with his 150-kn winds on the 23d. He was at super-typhoon strength from the 22d until the 24th (fig. 76). On the 26th about 100 mi west of the typhoon's center the SEA LAND DEFENDER encountered 77-kn northerly winds in 39-ft seas. The EASTSUN LOYAL with 18,693 tons of logs bound for China ran aground near the Sanbonmatsu Lighthouse at Maizuru, Japan but was refloated safely on the 28th. With the approach of typhoon Forrest the ship sought shelter at Miazuru where it unfortunately ran aground again. Tropical storm Georgia developed in the South China Sea on the 28th, moved across Hainan on the last day of the month and into Vietnam on the 1st.

Three of the eastern North Pacific tropical cyclones reached hurricane strength. Lorena and Manuel both developed near the 100th meridian and headed toward the west-northwest. Lorena attained hurricane status on the 7th and winds reached a peak of 100 kn the following day. Manuel became a hurricane one week later and maintained that intensity until the 18th; maximum winds were estimated at 100 kn on the 17th. Tropical storms Narda and Octave developed during the second half of the month but while Octave moved on a northward track Narda headed for the central Pacific. On the last day of the month Priscilla came to life. She moved toward the west-northwest but then turned northward after reaching the 15th parallel on the 4th; by this time she was already at hurricane strength. In fact she was at peak intensity, generating 100-kn winds. However, moving over cooler waters Priscilla began to weaken.

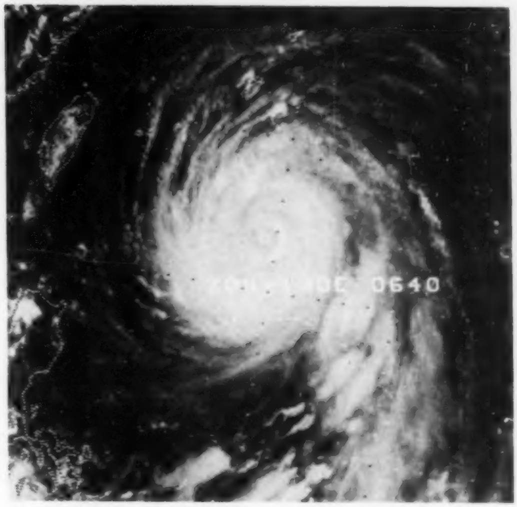


Figure 76.-- Forrest as a supertyphoon as seen by satellite on the 24th.

Of the two North Atlantic storms Chantal generating a peak 65-kn winds was the hurricane while tropical storm Dean caused some problems by moving into Virginia.

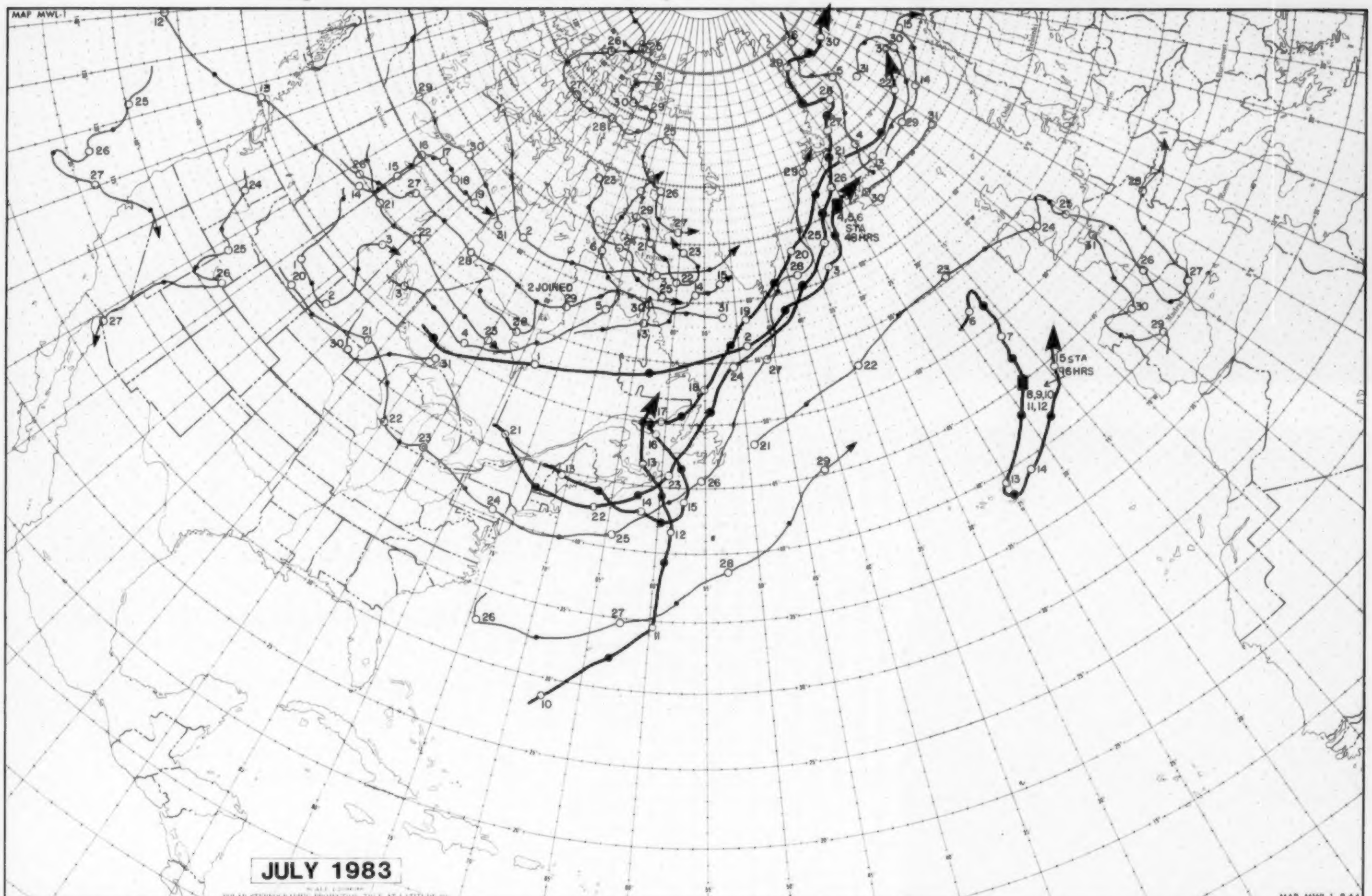
TROPICAL CYCLONE WATCH, 1983

Table 7 is a preliminary list of the global tropical cyclones that have occurred through December 1983.

Table 7.--Tropical Cyclone Watch, 1983

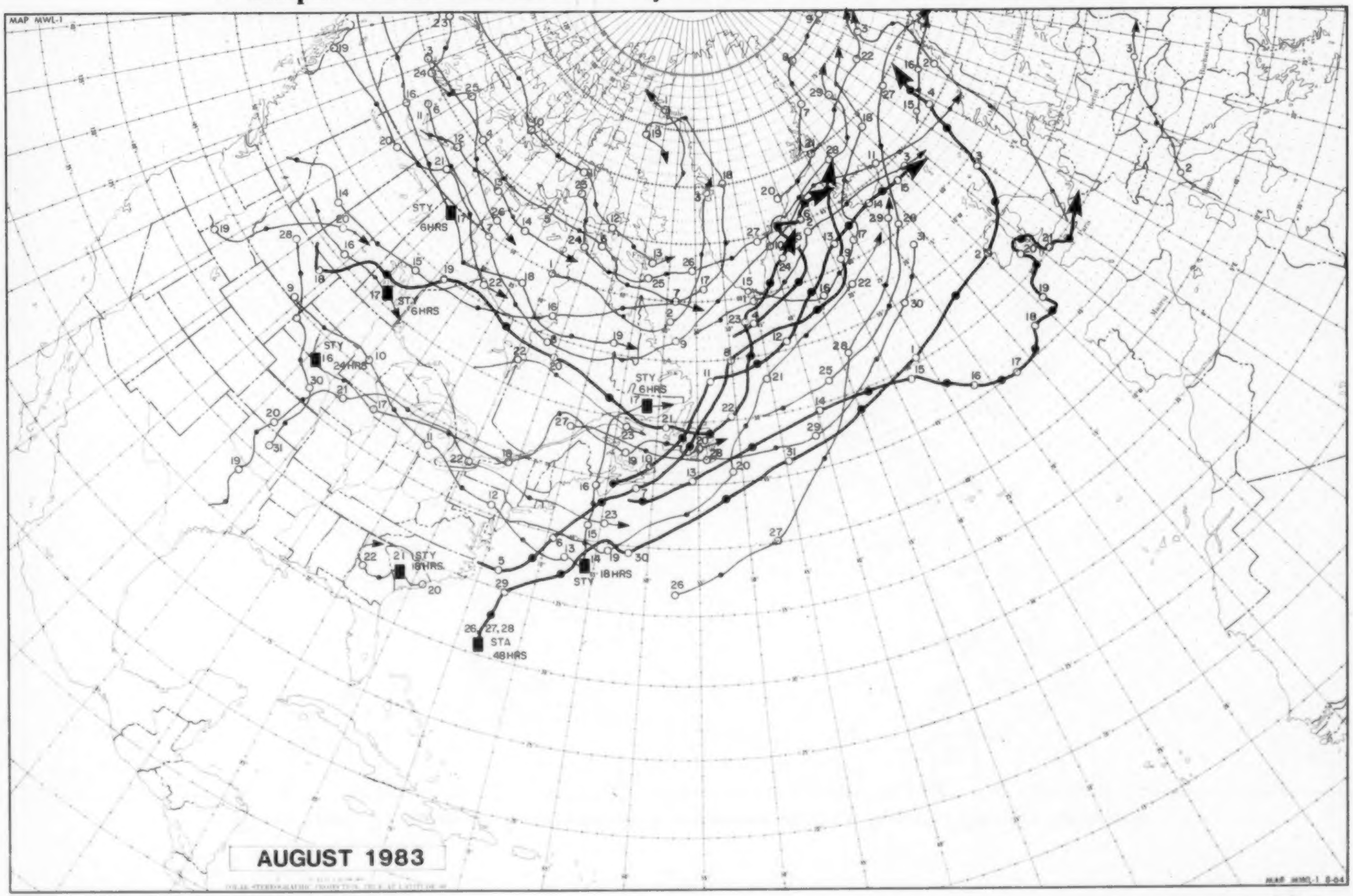
Western North Pacific			
Sarah	Tc-1	T	June
Tip	Tc-2	H	July
Vera	Tc-3	H	July
Wayne	Tc-4	H	July
Abby	Tc-5	H	Aug.
Ben	Tc-7	T	Aug.
Carmen	Tc-6	T	Aug.
Dom	Tc-8	T	Aug.
Ellen	Tc-10	H	Aug.
Forrest	Tc-11	H	Sept.
Georgia	Tc-12	T	Sept.
Herbert	Tc-13	T	Oct.
Ida	Tc-14	H	Oct.
Joe	Tc-15	T	Oct.
Kim	Tc-16	T	Oct.
Lex	Tc-17	H	Oct.
Marge	Tc-18	H	Oct.
Norris	Tc-19	T	Nov.
Orchid	Tc-20	H	Nov.
Percy	Tc-21	H	Nov.
Ruth	Tc-22	T	Nov.
Sperry	Tc-23	T	Dec.
Thelma	Tc-24	T	Dec.
North Atlantic			
Alicia		H	Aug.
Barry		H	Aug.
Chantal		H	Sept.
Dean		T	Sept.
Australia-South Pacific			
Jane	07S-83	H	Jan.
Des	09S-83	T	Jan.
Mark	10S-83	H	Jan.
Namo	11S-83	T	Jan.
Elinor	13S-83	H	Feb.
Nisha	14S-83	H	Feb.
Oscar	15S-83	H	Feb.
Prema	16S-83	T	Feb.
Ken	17S-83	T	Feb.
Rewa	18S-83	H	Mar.
Sarah	19S-83	H	Mar.
Tomasi	20S-83	H	Mar.
Lena	21S-83	T	April
Veena	22S-83	H	April
William	23S-83	H	April
Monty	25S-83	T	April
Fritz	07P-83	T	Dec.
Atu	10P-83	T	Dec.
South Indian Ocean			
Elinah	8S-83	T	Jan.
--	12S-83	T	Feb.
Naomi	24S-83	T	April
TC 01S		T	July
Pearl	03S-83	T	Nov.
--	04S-83	T	Nov.
Quenton	05S-83	H	Nov.
Andry	06S-83	H	Dec.
Esther	08S-83	T	Dec.
Bakoly	09S-83	H	Dec.
North Indian			
Aurora	01A	T	Aug.
--	02B-83	T	Oct.
--	03B-83	T	Nov.
Eastern North Pacific			
Adolph	Td-1	H	May
Barbara	Td-2	H	June
Cosme	Td-3	T	July
Dalila	Td-4	T	July
Erick	Td-5	T	July
Flossie	Td-6	T	July
Gil	Td-7	H	July
Henriette	Td-8	H	July
Ismal	Td-10	H	Aug.
Juliette	Td-12	T	Aug.
Kiko	Td-13	H	Aug.
Lorena	Td-14	H	Sept.
Manuel	Td-15	H	Sept.
Narda	Td-16	T	Sept.
Octave	Td-17	T	Sept.
Priscilla	Td-18	H	Sept.
Raymond	Td-19	H	Oct.
Sonia	Td-20	T	Oct.
Tico	Td-21	H	Oct.
Velma	Td-23	T	Nov.
Winnie	Td-24	H	Dec.

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



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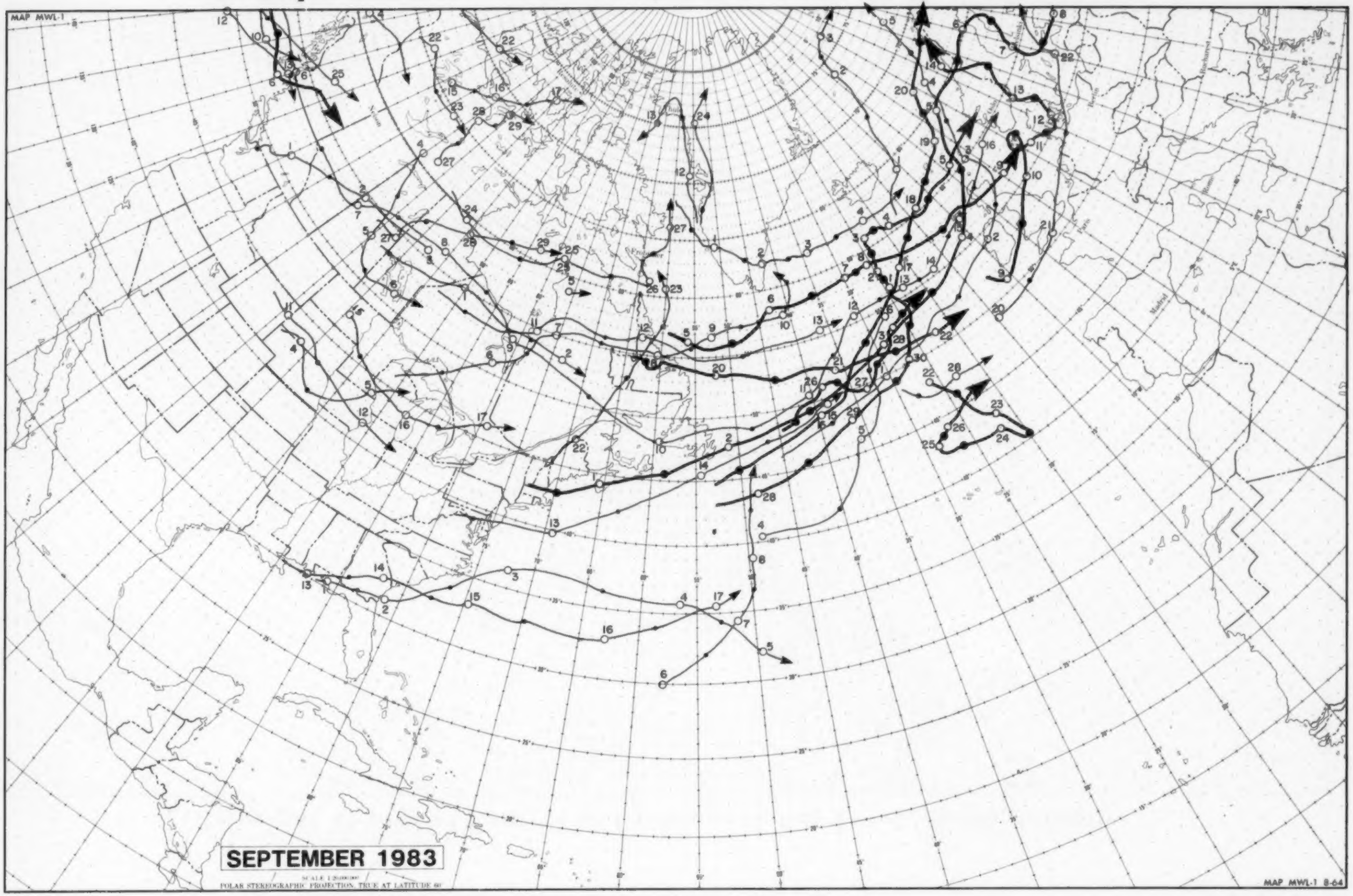
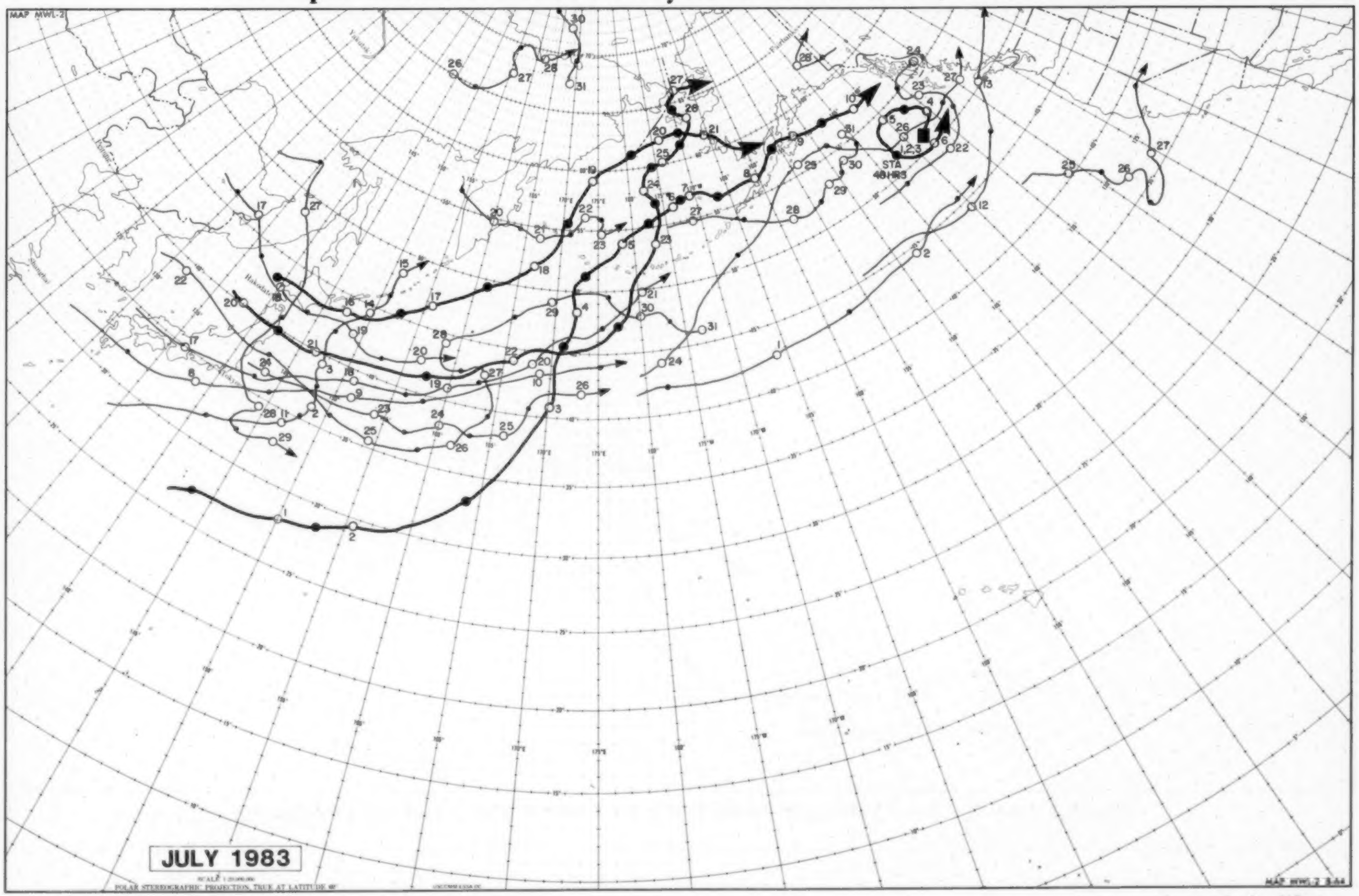
Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



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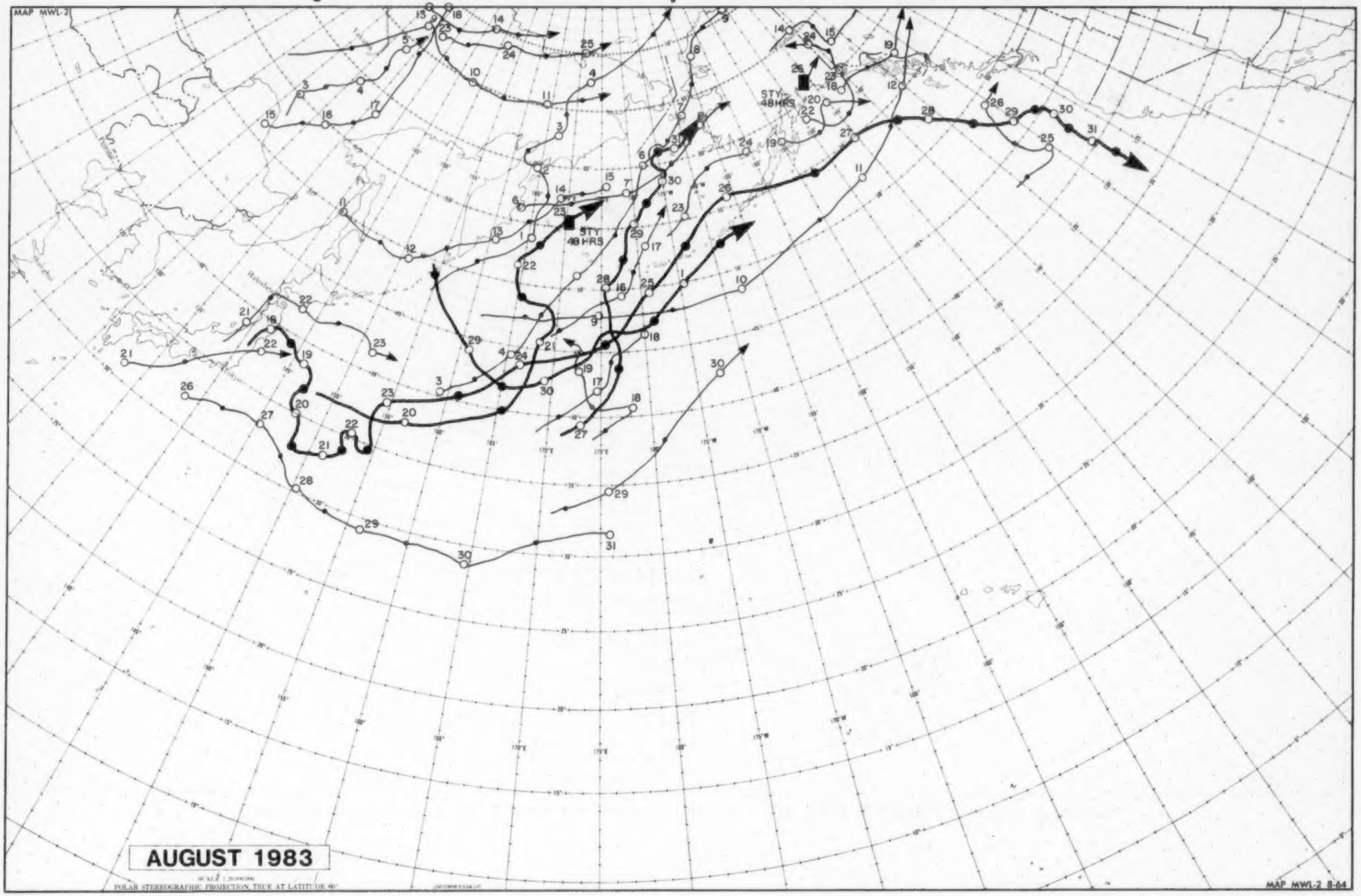
Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



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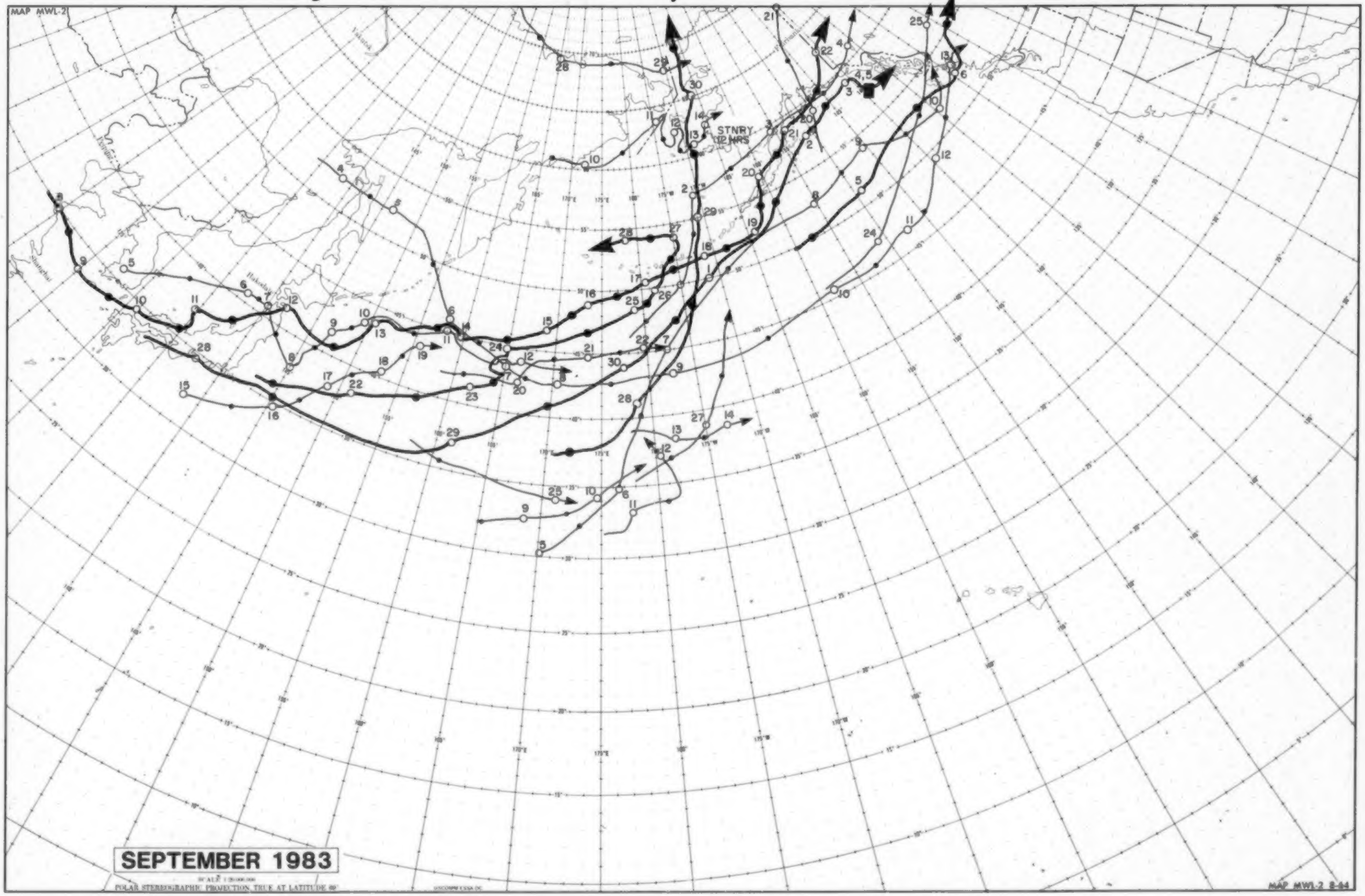
heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

North Atlantic Selected Gale and Wave Observations

July, August and September 1983

Vessel	Nationality	Date	Position of Ship: Lat. deg.	Position of Ship: Long. deg.	Time GMT	Wind: Dir. 10°	Wind: Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C: Air	Temperature °C: Sea	Sea Waves+: Period sec.	Sea Waves+: Height ft.	Swell Waves: Dir. 10°	Swell Waves: Period sec.*	Swell Waves: Height ft.
	ATLANTIC	JULY															
SEALAND PRODUCER	WJBJ	11	31.8 N	61.2 W	12	27	32	10 NM	01	1010.5	24.4	22.8	5	19.5	22	5	19.5
AMERICAN ARCHER	KFCS	12	40.1 N	62.6 W	18	30	25	10 NM	02	1014.2	25.0	23.3	4	5	03	6	19.5
BARBER TAIF	LIBD	13	40.2 N	67.8 W	00	20	50	2 NM	10	1018.0	20.0						
	KHAG	21	40.1 N	54.3 W	12	21	M 40	10 NM	02	1015.2	25.6	24.4	5	6.5	24	6	10
CYGNUS	WSDF	22	32.7 N	76.6 W	18	10	50	200 YD	97	1017.6	24.4		4	8	24	6	8
	D5DZ	23	15.3 N	69.1 W	06	09	M 25			1015.0	28.0	28.0	6	14.5	10	9	19.5
WESTWARD	WZL6190	23	43.5 N	67.4 W	06	35	28	5 NM	02	0999.1	15.0	12.1	4	19.5	35	12	26
SEALAND LEADER	WSNH	23	41.3 N	56.2 W	12	23	M 42	5 NM	01	1003.0	24.0	22.0	8	13	22	9	13
ACADIA	ICDR	23	39.2 N	56.0 W	22	23	40			1011.0	25.0	27.0	9	19.5	23	13	26
SEALAND LEADER	WSNH	24	41.2 N	60.0 W	00	26	M 40	5 NM	02	1007.0	22.0	20.0	8	11.5	24	9	14.5
TFL EXPRESS	9VPU	24	41.9 N	48.5 W	06	20	M 36	5 NM	02	1018.6	23.2	23.4	7	14.5	22	9	23
DEFIANCE	KRBS	24	36.8 N	54.2 W	06	19	30	5 NM	16	1015.7	22.3	24.0	6	14.5	21	6	32.5
USNS COMET TAKR 7	NJZP	24	42.0 N	50.7 W	18	22	31			1015.0	22.0	21.0	3	3	22	6	23
CYGNUS	WSDF	26	40.6 N	49.6 W	00	18	55	5 NM	02	1015.5	24.4		4	10	15	8	14.5
	D5TE	30	36.6 N	74.7 W	00	07	M 47	10 NM	01	1016.0	27.0	26.0	4	5	09	3	3
	ATLANTIC	AUG.															
	3ELE	4	38.3 N	73.1 W	00	23	M 21	5 NM	01	1021.0	26.0	24.0	4	13	24	8	19.5
CHRISTIAN MAERSK	OXJF	12	42.2 N	58.0 W	18	18	34	2 NM	25	1014.0	19.0		6	16.5	33	7	19.5
CYGNUS	WSDF	13	39.4 N	60.8 W	12	20	M 45	10 NM	03	1015.2	26.7	30.0	5	11.5	22	7	14.5
S.S. PONCE	WPJR	14	24.3 N	73.4 W	12	11	40	10 NM	29	1015.7	25.6	30.0	6	13	09	8	5
STAR CARRIER	D5MC	14	50.5 N	29.4 W	18	22	M 30	50 YD	54	1008.0	15.0	14.0	12	19.5	21	11	16.5
	WNCV	14	50.7 N	39.3 W	18	01	M 40	1 NM	62	1005.1	11.7	15.1	7	11.5			
STAR CARRIER	D5MC	15	50.1 N	32.9 W	06	33	M 40	50 YD	54	1003.0	12.0	11.0	14	24.5	33	14	21
OAKLAND	KPIV	15	46.1 N	41.5 W	06	01	40	5 NM	01	1023.0	17.8	22.8	3	8	31	5	11.5
ALMERIA LYKES	WDOU	15	45.6 N	29.9 W	18	31	45	5 NM	25	1007.0	17.8	22.2	8	11.5	31	13	39
SEALAND CONSUMER	WCHF	16	28.0 N	91.1 W	15	15	40	5 NM	81	1015.0	26.7	28.4	3	5	16	5	11.5
ALMERIA LYKES	WDOU	17	47.8 N	23.6 W	06	35	38	10 NM	02	1005.6	16.7	19.4	8	13	36	12	23
FREDERICKSBURG	KNJN	18	27.7 N	91.7 W	06	15	23	10 NM	01	1014.7	27.2	28.9	5	5	26	9	19.5
ITALICA	IBKL	21	42.5 N	59.4 W	06	23	M 45			1000.5	23.5	23.5	5	10			
TFL EXPRESS	9VPU	22	43.7 N	56.4 W	06	29	M 44	5 NM	21	1005.6	18.0	21.6	10	19.5	23	12	16.5
OGDEN DYNACHEM	KNJK	25	25.6 N	79.9 W	12	18	M 25	2 NM	18	1018.0	25.6	30.0	12	37.5			
	WLDP	25	11.8 N	76.3 W	12	07	25	5 NM	01	1011.5	28.0	27.8	5	6.5	06	10	19.5
SEALAND LEADER	WSNH	31	44.2 N	37.8 W	18	22	M 48			0996.2	24.0	20.0	10	19.5	22	10	16.5
	GR. LAKES	AUG.															
HERBERT C. JACKSON	WL3972	11	45.6 N	83.5 W	06	09	M 40	10 NM	81		17.0	18.0	8	6.5			
	ATLANTIC	SEP.															
AMERICAN RESOLUTE	KFDZ	1	52.3 N	29.2 W	06	10	65	200 YD	82	0984.5	10.0	16.7	7	11.5	10	7	11.5
SEALAND LEADER	WSNH	1	44.9 N	32.6 W	06	28	M 60			1006.0	17.0	20.0	10	23	27	14	26
T F L LIBERTY	9VDD	1	49.3 N	23.9 W	16	27	M 51	2 NM	07		17.0	17.7	XX	16.5	26	10	19.5
T F L LIBERTY	9VDD	2	49.0 N	25.3 W	00	32	M 52	2 NM	07	1009.5	13.5	16.0					
	6ZRT	2	47.6 N	31.7 W	06	32	30	5 NM	01	1022.0	14.0	17.0	8	21	35	12	32.5
AMERICAN LEADER	KFEJ	3	45.5 N	27.4 W	00	24	55	200 YD	89	1010.5	16.1	17.2	2	8	32	9	19.5
	6ZRT	3	45.5 N	36.4 W	06	24	27	.5 NM	51	1001.0	20.0	18.0	8	13	24	12	32.5
SEATTLE	KVWH	5	19.2 N	80.4 W	07	18	45	2 NM	64		25.5	28.9	8	24.5	18	8	24.5
CYGNUS	WSDF	17	57.5 N	19.6 W	18	15	50	2 NM	80	0954.0	11.1		5	19.5	15	10	18
CYGNUS	WSDF	18	56.5 N	24.5 W	18	32	50	5 NM	01	0996.5	10.0		5	19.5	32	10	19.5
AMERICAN ARCHER	KFCS	22	49.7 N	28.6 W	09	01	50			1008.7	12.8	14.4	12	19.5	01	12	19.5
SEALAND ADVENTURER	KSLJ	22	45.2 N	29.5 W	18	01	M 45	5 NM	03	0996.0	16.0	16.0	5	16.5	36	5	16.5
SEALAND PIONEER	WSVB	23	40.5 N	32.5 W	06	34	45	5 NM	81	1009.8	17.0	21.0	5	16.5	32	6	29.5
SEALAND CONSUMER	WCHF	24	48.1 N	30.5 W	18	02	45	5 NM	02	1013.3	13.9	16.7	3	8	02	9	16.5
FREDERICKSBURG	KNJN	25	30.8 N	72.3 W	23	05	55	10 NM	20	1017.5	22.8	26.7	4	11.5	06	18	32.5
FREDERICKSBURG	KNJN	26	28.0 N	70.5 W	12	16	18	5 NM	81	1011.2	26.1	28.3	8	11.5	03	16	46
SANTA CRUZ	KPCM	27	50.0 N	39.1 W	18	33	65	5 NM	07	1013.5	12.3	15.6	6	16.5	33	10	24.5
TFL EXPPESS	9VPU	29	37.8 N	71.3 W	12	07	M 49	2 NM	62	1015.7	21.5	26.0	7	18	07	12	21
	3ELE	29	38.3 N	73.1 W	18	06	M 46	2 NM	81	1015.7	18.9	21.1	6	11.5	09	8	19.5
MALLORY LYKES	KLPN	30	38.3 N	73.6 W	03	05	45	1 NM	60	1015.2	19.4	17.2	3	8	09	10	19.5
TFL FREEDOM	9VXX	30	48.1 N	28.6 W	06	21	M 40	1 NM			16.2	16.0	40	32.5			

+ Direction for sea waves same as wind direction
X Direction or period of waves indeterminate
M Measured wind

NOTE: The observations are selected from those with winds $\geq$ 40 kn or waves $\geq$ 20 ft from April through September and 45 kn or 30 ft October through March.

North Pacific Selected Gale and Wave Observations

July, August and September 1983

Vessel	Nationality	Date	Position of Ship: Lat. deg.	Position of Ship: Long. deg.	Time GMT	Wind: Dir. 10°	Wind: Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C: Air	Temperature °C: Sea	Sea Waves†: Period sec.	Sea Waves†: Height ft.	Swell Waves: Dir. 10°	Swell Waves: Period sec.*	Swell Waves: Height ft.
	PACIFIC	JULY															
GALVESTON	KBGA	1	51.2 N	130.3 W	06	12	50	1 NM	64	0997.6	12.7	12.7	8	18	17	9	18
SINALOA	OXNS	4	41.7 N	141.5 E	00	12	M 36	5 NM	58	1004.0	14.0	17.0	6	13	12	7	19.5
KENAI	WSNB	5	54.3 N	135.7 W	00	09	40	2 NM	15	1008.6	13.3	10.6	5	10	12	9	16.5
	ZCUT	8	13.6 N	95.2 W	18	02	M 24	10 NM		1011.2	28.5	30.0	4	5	02	7	19.5
MAIN EXPRESS	3EED	9	35.3 N	146.2 E	06	26	M 25	5 NM	02	1002.0	23.0	22.5	7	10	24	13	23
SAN MARCOS	KSNP	9	14.1 N	95.5 W	12	09	24	10 NM		1009.0	28.3	30.6	5	19.5	09	5	19.5
BARBARA FOSS	WYL4978	9	59.1 N	139.2 W	12	14	M 41	2 NM	62	1007.5	11.1	13.3	0	14.5	18	0	10
EXXON NORTH SLOPE	KHLG	9	47.6 N	132.7 W	18	21	20	2 NM	63	1021.5	12.8	12.2	6	10	21	9	19.5
B T SAN DIEGO	WSVR	11	37.2 N	123.6 W	06	35	33	10 NM	02	1015.0	14.4	13.3	2	8	35	9	19.5
	HPHM	11	32.6 N	134.8 E	21	06	M 28	5 NM	89	1000.6	23.0	27.1	7	6.5	06	8	41
PACIFIC VENTURE	HOVS	12	40.2 N	146.7 E	18	08	M 40	1 NM	50	1011.5							
B T ALASKA	WFQE	12	55.5 N	139.8 W	12	30	60	10 NM	50	1007.0	10.6	12.6					
PACIFIC VENTURE	HOVS	13	42.5 N	149.3 E	00	04	M 40	2 NM	41	1020.0	11.0						
	HPHM	13	33.6 N	140.7 E	00	03	M 27	5 NM	03	1009.1	21.2	24.0	6	18	25	5	19.5
GALVESTON	KBGA	14	51.4 N	130.7 W	12	29	35	10 NM		1015.9	13.3	14.4	6	13	30	8	21
	WLDP	15	16.4 N	123.1 E	12	15	30	5 NM	03	1007.9	28.0	29.4	4	11.5	16	9	19.5
BROOKS RANGE	WSRP	15	39.6 N	125.3 W	18	34	35	10 NM		1016.8	16.7	16.1	6	21			
M P GRACE	ELBG9	15	34.6 N	123.0 W	18	32	M 17	5 NM	01	1012.9	16.0	16.5	XX	6.5	34	XX	23
	WNND	15	38.8 N	124.4 W	18	32	40	5 NM	03	1014.0	17.8	11.1	5	13	32	12	13
	DYRJ	16	36.7 N	126.9 W	00	36	30	10 NM	01	1017.0	17.8	9.0	8	13	33	10	19.5
	WNDM	16	39.2 N	124.6 W	00	33	40	5 NM	05	1014.0	16.1	15.4	5	8	34	8	14.5
	DZHC	16	50.4 N	175.3 E	06	16	M 44	1 NM		1013.6	7.0	12.0	5	6.5	16	6	8
	KPKL	16	19.9 N	106.4 W	18	13	40	10 NM	03	1016.0	28.3	28.3	6	18	18	6	10
EXXON NORTH SLOPE	KHLG	19	12.9 N	92.7 W	00	12	25	10 NM		1009.0	31.1	28.3	8	8	16	10	19.5
SEA FAN	ELCG3	19	53.1 N	170.5 E	06	23	M 19	.25 NM	45	0996.0	10.0	8.5	7	19.5	23	6	16.5
CRYSTAL STAR	DSTG	20	35.8 N	124.6 W	18	36	M 45			1021.0	18.0	16.0	3	5	36	3	5
ASIA BRAVERY	ABCM	21	34.1 N	136.0 E	05	28	M 22	2 NM	10	1005.0	28.0	26.0	7	18	24	9	24.5
	ABSW	22	41.1 N	145.5 E	06	17	M 16	5 NM	40	1007.0	16.5	12.0	5	6.5	16	10	19.5
	WPCE	23	18.5 N	128.4 E	06	07	45	5 NM	58	1001.0	28.3	28.9	5	8	07	4	8
BLUE OCEAN	JKQH	23	45.3 N	176.2 W	09	22	M 43	< 50 YD		1005.0	13.5	8.0	4	6.5	22	4	5
VAN CONQUEROR	A8IB	24	53.6 N	179.5 W	06	24	M 40	2 NM	05	0986.5	9.0	9.3	8	10	25	8	13
GALLEON HONOR	DZDI	24	46.3 N	177.1 E	02	26	11	< 50 YD	50	1002.8	0.8	8.4			26	26	42.5
S.S. LNG TAURUS	WDZW	24	20.2 N	124.2 E	18	15	M 27	10 NM	01	1010.5	27.5	29.4			15	16	24.5
BAY BRIDGE	3EYN	26	22.5 N	120.2 E	02	16	M 57	50 YD	07	0997.0	27.0	27.0	20	23	16	20	23
ALEUTIAN DEVELOPER	WIPL	28	54.0 N	156.5 W	06	10	M 26	5 NM		1006.5	9.4	11.7	6	6.5	17	7	19.5
	3FPJ	29	53.0 N	132.9 W	18	16	M 40	1 NM		1017.5	14.0	16.0	8	6.5	16	10	13
KEYSTONE CANYON	KSFK	29	21.6 N	109.1 W	18	32	48	10 NM	03	1011.5	30.6	29.4	4	3	21	12	19.5
	WTDN	30	51.3 N	178.5 E	06	09	M 22	5 NM	40	1012.3	7.2	6.7	8	6.5	06	12	19.5
	PACIFIC	AUG.															
	HPOP	1	19.0 N	105.0 W	06	32	M 12	> 25 NM	00	1012.5	30.0	30.0	4	19.5	04	4	3
MAIN EXPRESS	3EED	1	50.7 N	169.5 E	12	19	M 34	5 NM		1007.0	8.0	8.0	7	16.5	15	13	19.5
MAIN EXPRESS	3EED	2	48.5 N	162.8 E	06	27	M 26	2 NM	05	1008.0	10.0	10.0	8	14.5	27	10	19.5
ADRIAN MAERSK	OYIT	3	48.8 N	152.0 W	06	30	49	5 NM	50	1022.5	11.5		7	6.5			
	3EVG2	4	35.9 N	149.3 E	06	01	M 40	10 NM	03	1011.5	29.0	19.0	3	6.5	05	4	6.5
	3EVG2	5	39.1 N	158.3 E	18	22	M 67	5 NM	03	1019.0	11.5	16.0	3	6.5	05	4	8
	WLDP	5	21.2 N	165.7 W	18	07	20	10 NM	15	1022.5	24.3	27.2	3	10	06	13	19.5
	3EVG2	6	40.2 N	161.5 E	06	07	M 61	5 NM	03	1019.0	19.0	14.0	3	6.5	04	3	6.5
	KWLR	7	59.1 N	140.3 W	00	10	M 42	2 NM	61	1012.9	14.4	13.3	6	8	17	9	6.5
MALLORY LYKES	KLPN	10	13.0 N	130.4 E	12	24	38	10 NM		1004.1	26.7	28.3	3	8	26	8	19.5
PACIFIC VENTURE	HOVS	13	33.0 N	135.0 E	00	08	M 45	5 NM	03	1007.5	29.0	23.0	4	10	08	4	10
	DZUT	13	22.0 N	136.3 E	12	20	M 46	2 NM		0997.4	29.0	30.0	9	32.5			
SANTA MARIANA	WSNA	13	16.2 N	99.7 W	18	05	14	10 NM	03	1012.0	31.7	31.1	4	3	06	4	19.5
	DZUT	14	19.8 N	134.3 E	18	22	M 43	2 NM		1001.2	29.0	30.0					
EXXON NEW ORLEANS	WNDM	14	40.8 N	126.3 W	18	10	M 40	10 NM	02	1016.0	17.7	17.7	6	11.5	10	6	11.5
	DZUT	15	18.7 N	133.4 E	06	22	M 32	5 NM		1002.7	31.0	30.0	4	19.5			
	W6JF	15	28.1 N	127.2 E	06	36	M 16	5 NM	01	0994.2	31.0	28.0	5	13	36	8	19.5
WORTH	WLHC	15	27.8 N	143.1 E	06	23	40	200 YD	65	1002.8	23.8	26.7	3	14.5	23	6	19.5
	D7YO	15	53.4 N	158.8 W	18	26	M 26	1 NM	21	1016.0	13.0	12.0	5	19.5			
WORTH	WLHC	16	26.3 N	142.8 E	00	28	25	2 NM	11	1005.0	28.3	26.7	10	19.5	24	24	24.5
	D7YO	16	53.2 N	160.0 W	08	24	M 26	1 NM	10	1017.0	13.0	12.0	6	19.5			
	6ZCU	19	42.7 N	152.5 E	06	11	M 22	5 NM	01	1009.0	21.0	17.0	5	13	13	8	23
GALVESTON	KBGA	19	53.8 N	135.4 W	06	23	M 35	5 NM	80	1006.0	14.0	15.6	3	16.5	23	7	24.5
CHARLES LYKES	KLHR	21	34.2 N	166.0 E	06	21	30	5 NM	05	0998.0	26.1	23.9	7	18	18	7	26
TOWNSEND CROMWELL	WTDF	21	41.0 N	170.2 E	06	20	M 44			0990.6	20.6	18.1	3	6.5	17	8	19.5
MAYA PIONEER	H9TM	21	53.6 N	148.9 W	12	11	M 40			0997.0	9.0		6	16.5	11	6	16.5
SEA FAN	ELCG3	21	47.9 N	129.3 W	23	33	M 20	5 NM	12	1022.0	17.0	16.0	6	19.5	33	5	16.5
	K6JF	22	44.8 N	162.9 E	00	24	M 32	10 NM	02	1000.0	12.0	12.0	7	8	31	10	19.5
	A8FO	24	35.2 N	152.2 E	18	20	M 65	10 NM		1012.0	24.0	24.5			20	3	6.5
	A8FO	25	35.3 N	153.7 E	00	24	M 40	10 NM		1013.2	29.0	25.0			05	6	6.5
	OWDX	25	50.8 N	172.6 W	06	18	10	10 NM	02	1012.0	12.5		XX	1.5	24	XX	19.5
MAYA PIONEER	H9TM	26	49.5 N	165.7 E	18	35	M 46			1013.0	6.0		4	6.5	35	4	6.5
EXXON PHILADELPHIA	WNFJ	27	52.7 N	137.8 W	12	16	M 40	2 NM		0997.0	14.0	12.4					
MOBILOIL	WMTO	27	57.3 N	140.8 W	18	03	40	2 NM	63	0997.3	13.3	14.4	8	8	03	10	16.5
FAIRWEATHER	WTEB	27	55.2 N	143.8 W	18	35	M 40	5 NM	03	0998.5	11.1	14.4	4	6.5	04	8	18
FAIRWEATHER	WTEB	28	55.2 N	142.2 W	00	35	M 40	2 NM	07	0994.6	13.4	13.9	5	10	01	8	23
GALVESTON	KBGA	28	55.5 N	141.1 W	12	01	M 20	10 NM		1005.4	14.4	13.9	6	8	06	6	19.5
PRESIDENT LINCOLN	KDBG	28	49.1 N	178.3 E	18	20	M 40	5 NM	03	0986.5	11.7	10.0	7	10	20	5	13
PRESIDENT LINCOLN	KDBG	29	49.5 N	178.4 W	00	22	M 41	5 NM	02	1001.9	13.9	10.0	6	10	20	6	13
LEXA MAERSK	OXFB	29	45.0 N	139.1 W	06	30	40			1012.5	16.0		16	16.5			
	DZLE	31	34.1 N	150.6 E	06	12	17	10 NM	03	1014.0	28.5	23.0	1	1.5	32	2	19.5

Vessel	Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C. Air	Temperature °C. Sea	Sea Waves+ Period sec.	Sea Waves+ Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
	PACIFIC	SEP.															
MOBILOIL	WMTO	4	39.7 N	124.8 W	18	36	55	5 NM	02	1009.8	18.3	15.6	6	10	36	10	23
	H3DB	5	56.3 N	147.6 W	06	27	M 21	10 NM	02	1001.0	11.0	15.0	12	10	23	13	32.5
PRESIDENT MC KINLFY	WVFZ	5	39.3 N	125.8 W	18	34	45	10 NM	02	1008.0	19.4	17.8	10	5	34	34	11.5
PRESIDENT MC KINLEY	WVFZ	6	39.6 N	127.5 W	06	35	45	10 NM	02	1010.0	16.7	17.8	6	5	35	10	8
	JAVB	6	52.8 N	144.8 W	21	04	M 45	5 NM		1001.5	13.0		5	8	30	6	8
	A6HX	8	18.4 N	174.0 W	21	11	45	2 NM	64	1008.0	26.5	27.0	10	10	11	16	26
MAIN EXPRESS	3EFD	14	41.9 N	152.6 E	00	28	M 51	1 NM		0989.5	16.0	19.0	10	16.5	28	12	14.5
ARCTIC TOKYO	5LJT	14	48.9 N	158.6 E	18	04	M 45	5 NM	01	1002.0	10.0	11.0	10	6.5			
ORIENTAL KNIGHT	H9VM	16	36.1 N	150.2 E	18	09	45	5 NM		1006.0	22.5	24.0	9	13	09	9	14.5
VAN CONQUEROR	A8IB	17	53.8 N	179.5 W	12	07	M 55	2 NM	50	0997.0	7.0	8.0					
BARBER TONSPERG	LIDD	17	38.0 N	148.1 E	12	13	45			1000.9	23.0		XX	19.5			
ORIENTAL KNIGHT	H9VM	17	37.3 N	159.4 E	18	09	46	5 NM	61	1015.0	19.0	21.0	8	21	11	9	23
VAN CONQUEROR	A8IB	18	53.5 N	176.3 E	00	03	M 66	1 NM	52	1005.0	7.0	9.0	10	13	06	10	13
ALEUTIAN DEVELOPER	WIPL	18	55.0 N	162.0 W	00	09	M 56	2 NM	64	1010.5	10.0	10.0	6	14.5	10	9	16.5
PRESIDENT GRANT	WEZD	19	52.4 N	153.5 W	18	19	M 45			0992.9	12.8	12.2	6	19.5	18	10	19.5
	5MKM	20	53.6 N	150.6 W	00	20	M 45	1 NM		1004.3	15.0	13.0	13	18	21	16	24.5
SOCONY VACUUM	KIGL	20	41.7 N	130.9 W	06	05	52	10 NM	00	1023.0	15.6	16.7	8	23	05	12	26
	ELFX7	21	47.1 N	149.7 W	00	16	M 50	.25 NM	61	1006.5	17.0	16.0	5	14.5	13	9	18
SOCONY VACUUM	KIGL	21	43.6 N	128.0 W	00	04	50	10 NM	02	1019.0	18.3	16.7	10	23	04	11	29.5
ORIENTAL EXECUTIVE	D5AN	21	53.7 N	154.5 W	12	27	M 54	5 NM	00	1008.5	13.0	14.0					
CORNUCOPIA	KPJC	23	44.4 N	164.4 E	18	11	45	2 NM	63	1002.1	10.0	10.6	6	8	10	11	13
GOLD LUCKY	3EHH2	24	43.4 N	165.8 E	00	10	M 55	1 NM	81	0993.5	12.0	13.0			12	14	19.5
CORNUCOPIA	KPJC	24	43.8 N	162.2 E	00	09	52	200 YD		1008.7	10.0	10.6	9	18	09	12	24.5
ARCO ANCHORAGE	WCIO	24	55.5 N	140.0 W	00	18	M 66	1 NM	07	0994.0	11.7	11.1	6	10	18	7	13
SEALAND DEFENDER	KGJB	25	28.1 N	124.4 E	23	05	M 60	.25 NM	81		27.0	30.0	12	19.5			
SEALAND DEFENDER	KGJB	26	27.1 N	123.0 E	03	35	M 77	200 YD	81		25.0	29.0	12	39			
	H3SG	27	42.5 N	163.5 E	18	27	M 03			1000.0	11.0		10	1.5	27	10	44
LEDA MAERSK	OULU	28	30.0 N	128.4 E	00	30	50	5 NM	02	1000.5	25.0		8	10	29	9	26
HOEGH MIRANDA	LICZ	28	34.9 N	140.5 E	12	33	M 47	50 YD	82	0996.0	23.0		XX	13			
S.S. LNG TAURUS	WDZW	28	31.5 N	136.1 E	12	24	M 52	2 NM		1001.0	27.0	28.3					
FALSTRIA	OYPG	29	26.7 N	129.9 E	00	02	M 60			1013.2	27.0		2	1.5	XX	XX	10
	ATJV	29	42.4 N	173.0 W	03	24	60			1002.4	15.0		6	19.5	22	10	23
HOEGH CAIRN	LICX	29	35.4 N	152.2 E	06	03	50	2 NM		0986.0	19.0	23.0	XX	13			
	LIOL	29	52.7 N	166.9 W	12	20	M 52	50 YD		0974.0	9.5						
	9VKG	29	54.0 N	174.6 W	14	29	58	2 NM	53		10.0						
SEALAND VOYAGER	KHRK	30	36.3 N	166.3 E	05	27	M 50	5 NM	16	0996.7	20.0	19.0	9	24.5	26	11	28
GALLEON HONOR	DZDI	30	41.1 N	147.2 W	22	26	28	< 50 YD		1002.6	12.1				26	27	44

+ Direction of sea waves same as wind
X Direction or period of waves indeterminate
M Measured wind

NOTE: The observations are selected from those with winds ≥ 40 kn or waves ≥ 20 ft from April through September and 45 kn or 30 ft October through March.

U.S. Voluntary Observing Ship Weather Reports

July, August and September 1983

TOTAL WEATHER REPORTS RECEIVED FROM US COOPERATIVE OBSERVING SHIPS JULY-SEPTEMBER 1983

SHIP NAME	VIA RADIO	VIA MAIL
ABUL KALAM AZAD	24	
ALASKA STANDARD	14	43
ALEUTIAN DEVELOPER	57	189
AMCO VOYAGER	82	135
AMERICAN ACE	61	66
AMERICAN ARCHER	75	170
AMERICAN HIGHWAY	29	
AMERICAN LEGACY	69	212
AMERICAN LYNX	28	142
AMERICAN TRADER	29	99
AMOCO YORKTOWN	43	
AQUARIUS	52	186
ARCO JUNEAU	20	
ARGONAUT	29	125
ASIA BRAVERY	2	52
ASIAN EXPRESS	18	
AUSTRAL PIONEER	7	30
BALD BUTTE		67
BARBER PRIAM		97
BARBER TOBA	29	
BASSWOOD WLB388	1	
BENSON FORD	3	86
BLUE OCEAN	11	109
BORINQUEN	85	91
BRINTON LYKES	4	
C K APOLLO	20	
CAPRICORN		112
CHARLESTON	68	154
CHEROKEE WMEC 165	1	65
CHEVRON ARIZONA	40	89
CHEVRON LOUISIANA	24	44
CHEVRON ROME		88
CHRISTOPHER LYKES	21	30
CLIFFORD MAERSK	38	252
COLUMBUS LOUISANA	65	
CRYSTAL STAR	22	62
DACEBANK	79	
DAVID D. IRWIN	1	29
DAVIDSON	17	16
DEL VIENTO	18	
DELTA MAR	8	20
DISCOVERER OSS	136	204
DRAGOR MAERSK	27	60
EASTERN DIAMOND	38	172
EASTERN WORLD	2	
EDWIN H GOTT		155
EMPIRE STATE	8	10
ESSO EVERETT	7	
EVERGREEN WAGO-295	1	
EXPORT FREEDOM	31	90
EXXON GETTYSBURG	3	10
EXXON LEXINGTON	9	27
EXXON PHILADELPHIA	21	58
FALSTRIA	51	111
FRANCIS SINCERE NO 6	12	
GALLATIN WHEC 721	21	27
GALVESTON	39	138
GENEVIEVE LYKES	17	
GERONIMO		7
GOLD LUCKY		6
GOWA	18	59
GREEN FOREST	34	
GUADALUPE I	24	125
H. LEE WHITE		169
HARDANGER	14	20
HERBERT C. JACKSON	79	154
HOEGH CAIRN	30	74
HOEGH MIRANDA	19	109
HOTAKA MARU	54	29
INACHUS STAR	42	
IRVING MIAMI	2	
J. L. MAUTHE		130
JAPAN AMBROSE	76	57
JOHN G MUNSON		88
KAUAI	65	209
KEYSTONE CANYON	10	35
KOREAN COMMANDER	101	164
KOREAN WONIS ONE		14
LASH ATLANTICO	19	64
LAVAUX	36	
LEXA MAERSK	59	112
LOUISE LYKES	6	
LYNCH T-AGOR 7	78	133
MAIN EXPRESS	70	165
MANULANI	56	118
MARIA TOPIC	19	38
MATARAM	10	
MAYO LYKES	48	78
MELVIN H. BAKER	101	
MIDGETT WHEC 726	49	54
MING STAR	44	
MOBIL AERO	14	28
MOBILOIL	52	94
MORMACDRACO	29	138
MORMACVEGA	35	121
NANCY LYKES	10	29
NEPTUNE PEARL	73	175
NOAA SHIP FERREL		85
NORTHERN LIGHT	23	
OCEAN LOG		51
OGDEN THAMES	19	
ORCO TRADER	83	251
ORIENTAL SOVEREIGN	33	76
OVERSEAS CHICAGO	21	38
OVERSEAS OHIO	17	37
PACDUKE	38	
PACIFIC SAGA	44	
PACMAJESTY	17	10
PACSTAR	25	
PARALLA	39	68
PHILADELPHIA	51	129
POLYNESIA	77	265
PRESIDENT CLEVELAND	27	
PRESIDENT JACKSON	55	95
PRESIDENT LINCOLN	49	121

SHIP NAME	VIA RADIO	VIA MAIL
ACACIA WLB406	1	2
ALASKAN	51	163
ALLISON LYKES	35	65
AMELIA TOPIC	17	24
AMERICAN ALLIANCE	74	186
AMERICAN ARGOSY	29	78
AMERICAN LANCER	38	150
AMERICAN LEGEND	26	116
AMERICAN MARKETER	66	143
AMERICANA	1	
ANJA LEONHARDT	17	
ARCO ALASKA	20	12
ARCO SAG RIVER	4	2
ARIES	5	
ASIA HERON	40	72
ATIGUN PASS	63	212
B T ALASKA	35	162
BALTIMORE	6	7
BARBER TAIF	29	67
BARBER TONSBERG	13	58
BAY BRIDGE	36	65
BERNINA	12	121
BOGASARI DUA	57	
BOSTON	80	99
BROOKS RANGE	17	67
CALCITE II	5	18
CARNIVALE	20	
CHARLOTTE MAERSK	62	191
CHERRY VALLEY	15	23
CHEVRON BURNABY	26	135
CHEVRON MISSISSIPPI	18	141
CHEVRON WASHINGTON	12	41
CHUEN ON	56	231
CLOVER COC	13	
CORNUCOPIA	36	128
CYGNUS	79	182
DALLAS WHEC 716	82	
DAVID P REYNOLDS	40	111
DE STEIGUER T-AGOR12	1	
DELAWARE II	11	98
DELTA SUD	34	28
DOCTOR LYKES	51	137
DUANE	76	68
EASTERN FRIENDSHIP	36	93
EATON GLORIA	86	
EILEEN INGRAM	65	49
ENDEAVOR	8	
ESSO PALM BEACH	31	93
EXPORT CHALLENGER	15	
EXPORT PATRIOT	33	144
EXXON HOUSTON	20	26
EXXON NEW ORLEANS	20	27
EXXON SAN FRANCISCO	12	17
FESTIVALE	15	
FREDERICK LYKES	9	
GALLEON HONOR	1	9
GAMA GETAH	7	33
GEORGE A SLOAN	76	112
GLACIER BAY	23	2
GOLDEN ALASKA		35
GREAT LAND	8	11
GREEN FOWARD	62	72
GULF BANKER	7	
HANJIN POHANG	19	24
HARKNESS TAGS 32		23
HESS VOYAGER	29	
HOEGH CLIPPER	11	50
HOEGH SUN		27
HOWELL LYKES	33	
INGER	54	206
ITALICA	26	56
JALAMOKAMBI	1	
JAPAN APOLLO	50	41
JOHN LYKES	15	
KEIYO	8	20
KEYSTONER	42	113
KOREAN FIR	9	
KRPAN	5	
LASH ITALIA	2	
LEDA MAERSK	70	203
LICA MAERSK	36	85
LUCENT STAR	16	
M P GRACE	4	
MALAYAN KING		39
MARATHA SHOGUN	15	
MARINE CHEMICAL TRANSP	5	
MAUI	53	198
MAYON	3	11
MEONIA	50	75
MILLER FREEMAN	188	181
MING SUN	4	28
MOBIL ARCTIC	56	163
MOKU PAHU	63	182
MORMACLYNX	25	115
MT MITCHELL	74	111
NEPTUNE CRYSTAL	65	
NEW INDEPENDENCE	49	45
NODAWAY	1	
NORTHWIND WAGB 282	137	150
OCEANIC	135	172
OJI GLORIA	14	
ORE SATURN	1	
ORIENTAL TAIO	38	
OVERSEAS JUNEAU	10	17
PACBARON	15	43
PACEMPEROR	26	
PACIFIC SUNSHINE	7	12
PACMERCHANT	27	12
PAN DYNASTY	3	4
PASSUMPSIC AO-107	1	62
PHILIP R CLARKE		104
PORTLAND	82	114
PRESIDENT FILLMORE	36	34
PRESIDENT JEFFERSON	104	163
PRESIDENT MADISON	77	138

SHIP NAME	VIA RADIO	VIA MAIL
ACADIA	22	37
ALBATROSS IV	78	175
ALMERIA LYKES	40	69
AMERICA SUN	64	207
AMERICAN APOLLO	55	189
AMERICAN ASTRONAUT	56	160
AMERICAN LARK	49	138
AMERICAN LEGION	30	193
AMERICAN MERCHANT	182	121
AMOCO CAIRO	4	
ANNA MAERSK	39	108
ARCO ANCHORAGE	43	28
ARCO TEXAS	36	66
ASHLEY LYKES	9	13
ASIA HONESTY	46	
ATLANTIC RAINBOW	23	
B T SAN DIEGO		293
BALTIMORE TRADER	29	126
BARBER TENNESSEE	35	46
BARBER TSU	34	42
BAYAMON	39	91
BIBB WHEC 31	36	
BOGASARI SATU	2	
BOUTWELL WHEC 719		40
BUILDER	2	77
CALIFORNIA RAINBOW	20	
CHAPMAN	164	182
CHASE WHEC 718	3	
CHESNUT HILL	8	132
CHEVRON CALIFORNIA	58	112
CHEVRON OREGON	7	9
CHILULA WMEC-153	1	147
CITRUS WLB300	28	
CLOVER TRUST	3	
COVADONGA	22	140
D ALBERTIS	33	5
DANA AFRICA	5	
DAVID PACKARD	1	143
DEFIANCE	33	126
DELAWARE TRADER	9	
DIANA	23	59
DOLLY TURMAN	11	32
DURABLE	26	40
EASTERN PACIFIC	47	28
EDITA	4	
ELIZABETH LYKES	65	65
ERNEST R BREECH		23
EVER SPRING	19	17
EXPORT CHAMPION	10	65
EXXON BALTIMORE	43	128
EXXON HUNTINGTON	10	57
EXXON NEWARK	44	72
EXXON WASHINGTON	30	45
FIREBUSH WLB 393	17	
FREDERICKSBURG	46	112
GALLEON TOURMALINE	15	43
GAS LIBRA	3	
GEORGE A STINSON		160
GLOBAL FRONTIER	13	149
GOLDEN DAISY		27
GREAT OCEAN	65	109
GREEN SAIKAI	27	11
GULF MERCHANT	16	44
HANJIN SEOUL		19
HEKTOR	1	
HIKAWA MARU	43	14
HOEGH MARLIN	37	69
HONSING ARROW		38
HUDSON T-AG 184	45	82
IRIS ISLAND		158
J LOUIS	39	142
JAMES LYKES	5	9
JEAN LYKES	26	
JUSTINE FOSS		123
KENAI	26	144
KNORR	143	252
KOREAN JUPITER	19	19
L.W. FUNKHOUSER		79
LASH PACIFICO	10	49
LEISE MAERSK	96	218
LILLOOET	112	140
LUCOR MANOR	9	
M/V MYRON C. TAYLOR	20	46
MALLORY LYKES	63	191
MARCHEN MAERSK	1	17
MARJORIE LYKES	37	18
MAUMEE	91	223
MELLON WHEC 717		18
MESABI MINER		25
MING AUTUMN		20
MING WINTER	1	
MOBIL LUBE		15
MORMACALTAIR	23	171
MORMACRIGEL	16	76
NACIONAL MONCHIQUE	9	25
NEPTUNE DIAMOND	20	56
NEW JERSEY SUN	27	70
NORDIC PRINCE	29	
NORWAY	6	
OCTA	46	213
OLEANDER	146	123
ORIENTAL EXECUTIVE	42	172
OTTO N. MILLER	49	176
OVERSEAS MARILYN	30	114
PACBARONESS	20	
PACGLORY	44	33
PACIFIC VENTURE	76	94
PACMONARCH	27	
PAN TIDE	30	
PEIRCE	34	
PHOENIX	8	21
POTOMAC TRADER	41	85
PRESIDENT GRANT	48	140
PRESIDENT JOHNSON	86	212
PRESIDENT MC KINLEY	91	240

SHIP NAME	VIA RADIO	VIA MAIL
ADRIAN MAERSK	33	62
ALBERT MAERSK	17	40
AMCO TRADER	84	118
AMERICAN ACCORD	22	156
AMERICAN AQUARIUS	48	174
AMERICAN EXPLORER	44	71
AMERICAN LEADER	43	158
AMERICAN LIBERTY	79	222
AMERICAN RESOLUTE	71	143
AMOCO SINGAPORE	38	
ANNIE JOHNSON	9	20
ARCO FAIRBANKS	48	14
ARCTIC TOKYO		158
ASIA BEAUTY	37	106
ASIA INDUSTRY	18	
AUSTRAL ENVOY	1	
BACAB	6	
BANGLAR PROGOTI	1	
BARBER TERRIER	9	24
BARRANCA	48	135
BAYANO	60	174
BIEHL TRADER		74
BOHEME	28	57
BRIGHT SUN	69	195
BUNGA MELAWIS	117	262
CANAL ACE	13	62
CHARLES LYKES	43	169
CHASTINE MAERSK	137	
CHEVRON ANTWERP	1	221
CHEVRON COLORADO	22	103
CHEVRON PERTH		30
CHRISTIAN MAERSK	34	71
CLARA MAERSK	20	58
COLUMBUS AMERICA	103	
CRYSTAL REED	17	
D L BOWER		90
DANA AMERICA	5	
DAVID STARR JORDAN	12	59
DEL ORO	3	
DELTA CARIBE	13	31
DILIGENCE WMEC 616	12	
DONA MAGDALENA		65
EAGLE	11	
EASTERN VENTURE	52	36
EDWARD RUTLEDGE	59	140
ELTON HOYT II		163
ESSO BAYONNE		132
EVER VALUE	2	17
EXPORT COMMERCE	17	39
EXXON BATON ROUGE	8	28
EXXON JAMESTOWN	6	33
EXXON NORTH SLOPE	30	19
FAIRWEATHER	35	10
FORTALEZA	135	234
FRIENDSHIP	64	
GALLEON TRUST	26	76
GEMINI	4	
GEORGE M HUMPHREY	115	131
GLOMAR CHALLENGER	153	145
GOLDEN RAY	1	
GREEN AUKLET	41	
GREEN STAR	34	6
H J HAYNES		110
HARBOUR BRIDGE	84	59
HENRY FORD II		17
HILLYER BROWN	9	30
HOEGH MERIT	21	42
HONSING BREEZE	28	69
HUTLAND VENTURE	153	166
IRVIN L. CLYMER	57	75
J T HIGGINS		183
JAPAN ACE	113	40
JELA TOPIC	17	
KANE T-AGS 27	68	85
KENNETH E HILL	10	9
KOFUKU MARU	9	
KOREAN PRIDE	10	7
LAKE TAHOE	38	182
LAUREL WLB291	12	
LESLIE LYKES	19	8
LONG BEACH	10	
LURLINE	98	224
MAHARSHI KARVE	3	
MANUKAI	34	132
MARGARET LYKES	14	29
MASON LYKES	4	97
MAYA PIONEER		47
MELVILLE	39	93
METEOR T-AKR 9	20	23
MING GLORY	24	20
MISSION SANTA CLARA		31
MOBILFUEL	6	14
MORMACARGO	41	70
MORMACSUN	30	58
NAGARA	59	
NEPTUNE JADE	49	99
NEWARK	20	122
NORSE PILOT	5	
OAKLAND	58	159
OGDEN DYNACHEM		94
OLGA TOPIC	49	
ORIENTAL KNIGHT	26	83
OVERSEAS ARCTIC	42	159
OVERSEAS NEW YORK	46	155
PACDUCHESS	21	
PACIFIC ARROW	161	105
PACLADY	8	38
PACNOBLE	23	29
PANSUEOW	16	
PETERSBURG	17	58
POLAR ALASKA		181
PRESIDENT ADAMS	39	118
PRESIDENT HOOVER	69	112
PRESIDENT KENNEDY	15	
PRESIDENT MONROE	46	124

TOTAL WEATHER REPORTS RECEIVED FROM US COOPERATIVE OBSERVING SHIPS JULY-SEPTEMBER 1983

SHIP NAME	VIA RADIO	VIA MAIL		VIA RADIO	VIA MAIL		VIA RADIO	VIA MAIL		VIA RADIO	VIA MAIL
PRESIDENT PIERCE	37	102	PRESIDENT ROOSEVELT	3		PRESIDENT TAFT	21		PRESIDENT TAYLOR	33	
PRESIDENT TRUMAN	47	94	PRESIDENT TYLER	50	112	PRESIDENT VAN BUREN	2	162	PRESIDENT WASHINGTON	87	137
PRESIDENT WILSON	69	91	PRINCE OF TOKYO	110	184	PRINCE WILLIAM SOUND	52	171	PROVINCIA DE EL ORO	8	
PUNTA BRAVA	41	29	PUNTA MALVINAS	18	21	QUATSINO SOUND		203	QUINTINA	53	
RADIANT VENTURE	23	32	RAINIER	42		RALPH B JOHNSON	61		RED ARROW	11	19
RESEARCHER	46	112	ROACHBANK	28		ROBERT D CONRAD	30	74	ROBERT E LEE	15	87
ROSE		75	ROYAL VIKING STAR	1		RUTH LYKES	20	50	S P LEE		32
S.S. LNG TAURUS	10	146	S.S. MOBIL MERIDIAN	30	215	S.S. PONCE	4	46	S/S EXXON BOSTON	81	147
S/S MOBILE	1		SAINT LOUIS	23	29	SALVADOR	12	52	SAM HOUSTON	13	30
SAMOA	64	142	SAMUEL S	37	52	SAN JUAN	83	136	SAN MARCOS	38	146
SAN PEDRO	1		SANKO MAPLE	6		SANSINENA II	12	27	SANTA CLARA	40	68
SANTA CRUZ	12	20	SANTA ELENA	2		SANTA FE	19	39	SANTA ISABEL	5	12
SANTA JUANA	30	55	SANTA LUCIA	23	61	SANTA MAGDALENA	34	20	SANTA MARIA	29	136
SANTA MARIANA	31	26	SAPPHIRE	16		SARGODHA	39	52	SAUDI MAKKAH	51	
SAUDI RIYADH	19	33	SCILLA	5		SEA FAN		152	SEA QUEEN NO 1	70	111
SEALAND ADVENTURER	44	127	SEALAND CONSUMER	36	147	SEALAND DEFENDER	77	169	SEALAND DEVELOPER	61	124
SEALAND ECONOMY	37	145	SEALAND ENDURANCE	66	146	SEALAND EXPRESS	19	133	SEALAND FREEDOM	22	155
SEALAND INDEPENDENCE	54	143	SEALAND INNOVATOR	65	77	SEALAND LEADER	27	151	SEALAND LIBERATOR	23	132
SEALAND PACER	35	84	SEALAND PATRIOT	78	188	SEALAND PIONEER	34	121	SEALAND PRODUCER	38	121
SEALAND VENTURE	50	147	SEALAND VOYAGER	62	121	SEALIFT ANTARTIC	35		SEALIFT MEDITERRANEAN	80	138
SEAPAC LEXINGTON	13	16	SEATTLE		9	SENATOR	27	37	SEPTA	12	
SHANGRI LA	1		SHERMAN WHEC 720	5		SHINKOO MARU	51	101	SHIRLEY LYKES	25	
SHOSHONE T-AO 151	21	40	SIENA	81	194	SILAS BENT T-AGS 26		36	SIMBA	18	48
SINALOA	37	50	SKAUGRAN	74	142	SKOUBORD	82	164	SOCONY VACUUM		25
SOHIO INTREPID	17	87	SOLON TURMAN	12		SOUTH LIGHT	33		SOUTHERN CROSS	30	65
SOUTHWEST CAPE	32		SOVEREIGN VENTURE	49		SPARROWS POINT		132	STAR CARRIER	17	26
STAR DIEPPE	68		STAR ENTERPRISE	17	35	STAR MALAYSIA	30	61	STAR THAILAND	20	116
STEADFAST WMEC 623	4		STELLA LYKES	30	49	STONEWALL JACKSON	10		STORIS WMEC 38	3	46
STREAM DOLPHIN	38	40	STREAM HAWSER	6		SUGAR ISLANDER	42	10	SUN VIKING	38	39
SUNBELT DIXIE	158	74	SUNDEW WLB 404	9	30	SURVEYOR	133	150	SUSQUEHANNA	15	
SWEETBRIER WLB 405	10		T F L INDEPENDENCE	69	177	T F L LIBERTY	55	174	TACHIBANA	1	
TAI CORN	19		TENCHBANK	97		TEXACO GEORGIA		22	TEXACO GHENT	66	
TEXACO RHODE ISLAND	5	43	TEXAS CLIPPER	21		TEXAS TRADER	85	216	TFL DEMOCRACY	36	24
TFL ENTERPRISE	21	113	TFL EXPRESS	38	171	TFL FRANKLIN	15		TFL FREEDOM	37	147
TFL JEFFERSON	11	83	THOMAS G THOMPSON	164	232	THOMPSON LYKES	46	65	THOMPSON PASS	19	
TILLIE LYKES	50	202	TONCI TOPIC	9	72	TONSONIA	5		TOWER BRIDGE	82	
TOWNSEND CROMWELL	218	273	TRANSCOLUMBIA	8	1	TUSTUMENA	1		TYSON LYKES	60	177
UNIVERSE	39		USCGC IRONWOOD WLB 297	10		USCGC LIPAN	58	88	USCGC RESOLUTE WMEC 62	47	
USCGC VIGOROUS	2		USNS NORTH STAR III	3	17	USNS APACHE	12	33	USNS BARTLETT	18	71
USNS COMET TAKR 7	53	122	USNS MOHAWK	26	59	USNS NEOSHO (T-AO-143)		65	USNS PAWCATUCK TAO-108		208
USNS RIGEL TAF58		124	USNS SEALIFT PACIFIC	43	38	USNS TRUCKEE TAO-147		17	VALLEY FORGE	41	37
VAN CONQUEROR	83	135	VAN HAWK	44	19	VELMA LYKES	42	111	VEMA	1	
VENTUROUS WPC 625	1		VIOLET	19		WALCHAND	3		WALTER A. STERLING		45
WALTER RICE	30	184	WASHINGTON TRADER	16	192	WECOMA	52	127	WESTERN SUN		50
WESTWARD		30	WESTWARD VENTURE	76	97	WHITING	18	56	WILLIAM A. ROESCH		109
WILLIAM E MUSSMAN	8	45	WILLIAM HOOPER	21		WINTER STAR	43	120	WOODRUSH WLB407	12	
WORLD CANDOUR	19	18	WORTH	71	94	YOCONA WMEC 168	3		YOUNG SEAGULL	50	44
YUKON T-AO 152	59	84	ZEPHUNTER	55	109	ZIM HONGKONG	29		ZOELLA LYKES	9	

SUMMARY: GRAND TOTAL VIA RADIO 21125 GRAND TOTAL VIA MAIL 44617

WE OF NOAA ARE MAKING USE OF THIS SMALL AMOUNT OF SPACE TO EXTEND OUR THANKS TO ALL THE SHIPS' OFFICERS WHO ROUTINELY TAKE SHIPBOARD WEATHER OBSERVATIONS. TO US, THESE EXCELLENT OBSERVATIONS ARE PRICELESS. WE CERTAINLY APPRECIATE RECEIVING THEM REGULARLY.

U.S. NDBC Climatological Data

July, August and September 1983

JULY 1983			AIR TEMPERATURE (DEG C)							SEA TEMPERATURE (DEG C)							AIR-SEA TEMPERATURE DIFFERENCE (DEG C)						
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.9N	072.9W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
41002	32.3N	075.3W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
41006	29.3N	077.3W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
42001	25.9N	089.7W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
42002	26.0N	093.5W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
42003	26.0N	085.9W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
42007	30.1N	088.9W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
42008	28.7N	095.3W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
42009	29.3N	087.5W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
42011	29.6N	093.5W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
44003	40.8N	068.5W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
44004	38.5N	070.7W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
44005	42.7N	068.3W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
44007	43.5N	070.1W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
44008	40.5N	069.4W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45001	48.0N	087.6W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45002	45.3N	086.3W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45003	45.3N	082.8W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45004	47.2N	086.5W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45005	41.7N	082.5W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45006	47.3N	090.0W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45007	42.7N	087.1W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45008	44.3N	082.4W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45009	41.6N	082.0W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46001	56.3N	148.3W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46002	42.5N	130.3W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46003	51.9N	155.7W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46004	51.0N	136.0W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46005	46.1N	131.0W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46006	40.7N	137.7W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46010	46.2N	124.2W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46011	34.9N	120.9W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46012	37.4N	122.7W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46013	38.2N	123.3W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46014	39.2N	124.0W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46016	63.3N	170.3W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]														
46017	60.3N	172.3W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]														
46019	57.2N	170.3W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]														
46022	40.8N	124.5W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46023	34.3N	120.7W	741	31	21.2	11 21	14.1	06 12	15.7	731	31	18.1	09 23	14.3	07 11	16.3	741	31	03.2	11 21	-03.1	05 10	-00.6
46024	32.8N	119.2W	739	31	19.9	10 20	14.1	11 14	16.5	736	31	19.3	11 20	16.1	01 00	17.6	741	31	01.6	10 21	-04.2	11 16	-01.1
46025	33.6N	119.0W	744	31	21.5	21 00	16.5	13 15	18.5	711	31	22.3	29 23	18.3	10 11	19.8	744	31	01.4	11 18	-03.6	30 14	-01.3
46026	37.8N	122.7W	742	31	16.2	10 16	11.5	09 12	13.5	742	31	16.1	20 03	10.8	09 11	13.5	742	31	03.6	10 15	-02.3	21 16	00.0
51001	23.4N	162.3W	330	14	25.2	06 20	22.9	01 06	24.6	336	14	25.6	03 02	24.8	11 17	25.1	330	14	00.3	04 20	-02.3	01 06	-00.4
CSBF1	29.7N	085.4W	744	31	30.6	07 21	22.6	29 10	27.8														
DBLN6	42.6N	079.5W	592	26	30.9	03 23	11.5	07 09	21.8														

JULY 1983			PRESSURE (MB)							WIND SPEEDS (KNOTS)				MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	MAX	DY HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.9N	072.9W	744	31	1026.9	29 17	1008.1	24 08	1017.9	738	28	22 07	230	10.3	13.5	12.8	10.9	14.4	14.4	9.8	8.4	12.7
41002	32.3N	075.3W	744	31	1024.9	30 15	1011.0	26 09	1018.6	729	23	22 21	240	8.2	9.4	11.8	9.6	6.2	10.6	9.8	8.9	09.6
41006	29.3N	077.3W	744	31	1023.3	20 16	1012.8	26 23	1018.9	738	17	29 18	190	8.2	9.0	9.2	7.6	6.7	8.4	7.2	4.9	07.9
42001	25.9N	089.7W	744	31	1022.0	20 16	1014.2	15 23	1017.5	712	22	17 02	140	5.8	6.2	9.0	10.1	8.0	2.8	3.4	4.6	08.1
42002	26.0N	093.5W	744	31	1023.0	20 17	1013.1	15 23	1017.6	682	26	13 23	150	6.2	6.6	9.6	12.0	7.0	6.3	1.0	5.6	10.1
42003	26.0N	085.9W	743	31	1020.7	19 17	1013.6	29 09	1017.7	730	28	17 00	170	4.8	6.8	7.7	7.4	7.8	2.8	6.1	5.6	07.1
42007	30.1N	088.9W	739	31	1021.5	19 16	1013.5	26 23	1017.7	707	18	28 17	130	6.2	10.0	10.4	9.1	8.1	7.0	9.8	9.0	08.7
42008	28.7N	095.3W	743	31	1022.7	20 16	1010.8	16 03	1017.0	738	30	13 08	140	6.0	12.2	11.3	13.4	11.9	8.1	6.6	7.1	11.6
42009	29.3N	087.5W	744	31	1021.3	19 16	1014.0	27 10	1017.8	722	21	31 13	210	4.3	7.0	9.0	6.0	6.7	6.0	8.0	6.6	07.1
42011	29.6N	093.5W	740	31	1023.0	20 15	1013.6	16 08	1017.2	733	23	06 01	340	7.3	11.2	8.9	10.6	11.1	16.6	9.0	6.7	10.3
44003	40.8N	068.5W	744	31	1027.4	29 15	993.8	22 20	1013.7	728	27	22 20	280	7.3	6.8	11.8	7.4	6.9	6.9	7.3	7.1	07.1
44004	38.5N	070.7W	743	31	1028.1	29 16	1000.7	22 09	1015.2	732	27	22 11	310	8.9	8.3	7.0	9.0	10.2	10.4	10.8	10.1	10.1
44005	42.7N	068.3W	744	31	1024.5	29 02	990.5	22 20	1012.4	728	28	22 21	320	9.3	8.5	7.1	5.0	9.1	8.8	5.7	9.0	08.3
44007	43.5N	070.1W	713	31	1023.7	31 15	994.5	22 13	1012.8	718	22	22 16	350	8.4	6.1	5.1	5.6	9.6	10.5	6.0	8.9	08.9
44008	40.5N	069.4W	740	31	1027.2	29 16	997.1	22 09	1013.8	736	21	25 00	070	8.6	10.3	7.0	8.1	10.4	10.3	9.2	8.5	09.7
45001	48.0N	087.6W	741	31	1025.3	09 15	993.9	04 13	1013.8	695	19	04 15	240	5.2	6.0	5.3	6.4	6.8	7.3	7.7	6.3	06.7
45002	45.3N	086.3W	740	31	1026.4	06 16	1000.8	04 02	1014.6	221	23	31 21	290	9.1	5.1	4.0	5.3	7.0	9.0	6.1	7.7	07.7
45003	45.3N	082.8W	743	31	1026.5	07 15	1002.5	04 11	1014.5	706	23	05 09	290	7.7	6.3	6.3	5.3	8.1	7.0	7.3	8.6	07.8
45004	47.2N	086.5W	741	31	1025.7	06 17	997.6	04 06	1014.8	711	16	03 14	160	5.8	6.3	5.2	6.4	7.1	7.9	6.2	6.7	06.7
45005	41.7N	082.5W	742	31	1028.4	07 17	1005.6	23 22	1015.9	736	20	04 21	260	8.3	7.0	6.2	6.1	7.5	7.1	6.8	6.4	07.1
45006	47.3N	090.0W	743	31	1024.8	06 15	994.1	04 09	1014.3	718	18	04 12	230	3.9	7.1	6.0	5.7	6.2	8.0	6.5	4.4	06.8
45007	42.7N	087.1W	740	31	1028.1	07 17	1003.9	04 01	1015.9	715	24	22 01	010	9.9	6.1	4.7	5.9	8.0	7.6	6.4	6.3	07.4
45008	44.3N	082.4W	744	31	1026.7	07 16	1004.0	24 08	1014.8	704	21	05 12	310	6.5	4.7	4.5	4.6	8.3	7.2	5.9	7.5	06.9
45009	41.6N	082.0W	743	31	1028.3	07 17	1005.1	23 21	1015.7	714	26	21 20	010	8.8	7.8	5.8	6.3	9.5	7.4	6.9	5.3	07.6
46001	56.3N	148.3W	744	31	1030.1	15 21	998.4	28 19	1012.8	709	23	08 03	150	5.5	6.3	9.3	9.2	7.5	6.4	11.8	6.6	08.7
46002	42.5N	130.3W	744	31	1030.1	09 20	1005.0	01 11	1019.9	624	21	16 15	340	13.4	6.0			14.8	11.9	11.6	10.6	11.8
46003	51.9N	155.7W	743	31	1035.9	16 19	999.9	29 01	1015.6	740	25	07 13	170	9.2	5.7		14.4	13.8	14.3	15.0	11.9	13.5
46004	51.0N	136.0W	657	30	1029.1	16 14	993.4	01 00	1014.5	727	24	08 22	190	10.7	9.0	7.7	8.5	10.8	11.6	8.7	11.8	10.9
46005	46.1N	131.0W	744	31	1028.6	14 23	1009.8	01 13	1017.8	742	28	13 20	280	11.4	3.5	4.0	11.5	12.4	14.2	12.9	14.5	13.6
46006	40.7N	137.7W	517	25	1027.6	31 19	1010.3	01 03	1021.9	736	25	01 07	270	13.3	11.0	4.8	2.3	7.4	14.6	14.5	12.1	13.3
46010	46.2N	124.2W	741	31	1029.4	10 07	1002.8	01 13	1017.5	722	25	01 02	170	9.3	4.7	4.5	3.1	10.4	9.7	8.9	10.5	09.6
46011	34.9N	120.9W	740	31	1018.9	09 17	1009.3	16 10	1013.9	731	28	08 22	330	11.8	2.4			2.5	4.2	4.7	14.9	14.1
46012	37.4N	122.7W	743	31	1023.5	09 19	1009.3	16 11	1016.3	742	25	09 02	310	11.8				6.7	5.1	7.1	10.9	10.2
46013	38.2N	123.3W	742	31	1024.5	09 20	1008.3	16 12	1016.2	739	31	15 00	300	7.4	6.0			7.7	5.5	11.9	18.0	16.2
46014	39.2N	124.0W	743	31	1024.0	09 22	1008.9	16 13	1015.9	732	35	15 01	330	14.3	3.9	3.0	5.8	8.4	6.3	5.4	19.0	16.0
46016	63.3N	170.3W	244	31	1020.4	04 12	996.6	24 10	1010.4	242	24	24 12	140	8.5	12.5	9.4	12.6	11.1	8.8	9.3	8.9	10.3
46017	60.3N	172.3W	244	31	1020.3	30 09	982.6	24 18	1009.0	239	30	24 21	170	8.7	8.8	9.1	13.5	15.5	8.8	7.9	5.3	09.5
46019	57.2N	170.3W	063	06	1023.3	04 09	1000.4	07 15	1009.5	063	16	05 12	160	3.4	2.8	6.3	10.1	7.4	6.8	8.1	6.4	06.8
46022	40.8N	124.5W	744	31	1027.5	10 06	1009.7	01 04	1017.9	742	32	15 05	340	12.0	5.8	3.2	3.3	10.4	7.1	5.5	8.4	10.5
46023	34.3N	120.7W	741	31	1018.7	28 20	1008.6	16 09	1013.3	739	30	09 06	320	15.4	3.5	9.6	1.0			4.5	19.0	18.3
46024	32.8N	119.2W	746	31	1019.2	28 18	1010.3	16 09	1014.2	723	24	08 04	320	7.3	2.5	3.1	2.9	3.6	3.8	6.8	14.4	12.5
46025	33.6N	119.0W	744	31	1018.3	26 19	1009.1	16 09	1013.0	711	16	09 02	290	3.5	2.3	4.1	3.9	3.8	4.0	7.0	7.5	06.8
46026	37.8N	122.7W	742	31	1024.0	09 19	1008.4	16 11	1015.9	738	21	09 01	310	3.6	2.2	2.0		8.8	7.4	9.5	12.6	11.1
51001	23.4N	162.3W	330	14	1022.0	08 22	1016.2	11 04	1018.8	330	21	06 20	090		14.2	14.6						14.4
CSBF1	29.7N	085.4W	744	31	1021.8	13 15	1014.1	26 19	1018.3	734	16	19 01	270	2.6	3.7	5.7	3.8	4.7	5.7	7.5	3.2	05.3
DBLN6	42.6N	079.5W	596	26	1028.4	07 16	1006.2	23 21	1015.3	596	23	20 13	010	10.0	7.3	4.3	3.7	4.9	11.7	6.8	9.8	08.6

JULY 1983			WAVE HEIGHTS (METERS)				FREQUENCY OF WAVE HEIGHTS (%)							
BUOY	LAT	LONG	OBS	MAX	DY HR	MEAN	<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41001	34.9N	072.9W	742	3.5	22 10	1.2	9.5	78.8	10.2	1.3				
41002	32.3N	075.3W	161	1.5	05 23	1.0	3.7	96.2						
41006	29.3N	077.3W	741	2.5	28 19	1.2	5.2	81.0	13.7					
42001	25.9N	089.7W	646	1.5	17 02	0.6	66.8	33.1						
42002	26.0N	093.5W	739	2.0	13 16	0.8	48.8	47.4	3.6					
42003	26.0N	085.9W	726	2.5	17 01	0.6	71.6	27.8	0.5					
42007	30.1N	088.9W	350	1.5	29 16	0.6	72.5	27.4						
42009	29.3N	087.5W	689	2.0	29 16	0.6	71.9	27.1	0.8					
44003	40.8N	068.5W	744	5.0	22 23	1.0	29.9	62.7	4.0	2.2	0.9			
44004	38.5N	070.7W	742	3.5	22 14	1.0	33.6	58.4	5.9	1.8				
44005	42.7N	068.3W	744	4.5	22 21	1.0	30.6	61.0	6.5	1.0	0.6			
44007	43.5N	070.1W	704	1.5	01 16	0.6	72.0	27.9						
44008	40.5N	069.4W	741	3.0	22 17	0.8	45.3	49.7	4.5	0.2				
45001	48.0N	087.6W	451	3.5	04 18	0.7	72.5	24.3	2.2	0.8				
45002	45.3N	086.3W	541	3.0	01 21	0.8	58.9	34.0	6.2	0.7				
45003	45.3N	082.8W	493	2.5	06 11	0.6	70.6	28.4	0.9					
45004	47.2N	086.5W	132	1.0	23 22	0.5	92.4	7.5						
45005	41.7N	082.5W	522	2.0	06 05	0.6	69.3	30.4	0.1					
45006	47.3N	090.0W	330	2.5	04 16	0.6	74.2	23.3	2.4					
45007	42.7N	087.1W	475	2.5	06 22	0.7	66.3	29.8	3.7					
45008	44.3N	082.4W	494	2.5	05 13	0.7	68.2	30.3	1.4					
45009	41.6N	082.0W	336	1.5	06 04	0.5	85.1	14.8						
46001	56.3N	148.3W	742	4.0	06 06	1.5	6.4	52.8	38.2	2.2	0.1			
46002	42.5N	130.3W	341	3.0	01 00	1.8		45.7	46.6	7.6				
46003	51.9N	155.7W	741	3.0	24 18	1.5	3.8	66.3	27.4	3.0				
46004	51.0N	136.0W	743	4.0	09 02	1.7	8.4	49.3	43.3	6.1	0.6			
46005	46.1N	131.0W	744	3.5	13 20	1.6	6.5	49.1	39.6	4.5				
46006	40.7N	137.7W	742	4.0	02 02	1.5	5.1	62.1	28.0	4.5	0.1			
46010	46.2N	124.2W	734	3.5	01 04	1.4	8.3	68.9	18.8	3.9				
46011	34.9N	120.9W	740	3.5	08 03	1.7		53.3	42.9	3.6				
46012	37.4N	122.7W	742	4.0	15 04	1.7	1.0	48.2	44.3	6.1	0.1			
46013	38.2N	123.3W	741	4.5	14 22	2.1	1.2	27.9	47.5	19.5	3.7			
46014	39.2N	124.0W	742	4.5	15 01	1.8	4.7	43.3	41.2	9.2	1.3			
46022	40.8N	124.5W	744	4.5	15 04	1.5	8.6	64.5	20.6	4.9	1.2			
46023	34.3N	120.7W	740	4.0	09 08	2.0		33.9	55.5	10.4	0.1			
46024	32.8N	119.2W	733	3.0	08 04	1.7	0.4	52.2	45.9	1.3				
46025	33.6N	119.0W	733	2.0	08 03	1.0	14.5	83.9	1.5					
46026	37.8N	122.7W	740	3.5	16 05	1.4	8.2	69.8	20.4	1.8				
51001	23.4N	162.3W	330	3.5	06 13	2.2		18.1	71.8	10.0				
CSBF1	29.7N	085.4W	123	0.0	00 00	0.0								30.0

JULY 1983			TOTAL FREQUENCY OF WIND SPEEDS (%)							TOTAL FREQUENCY OF WIND DIRECTIONS (%)							
BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W		4.2	27.2	63.1	5.4			7.8	10.3	11.8	3.7	15.2	33.1	13.0	5.9
41002	32.3N	075.3W		4.1	56.5	38.7	0.7			4.2	10.5	11.1	3.5	10.2	41.3	17.2	2.0
41006	29.3N	077.3W		10.3	66.5	23.2				6.6	9.6	14.1	7.9	25.5	21.1	13.1	1.8
42001	25.9N	089.7W		12.6	57.3	29.8	0.1			8.5	13.9	39.6	25.1	4.9	2.2	1.9	3.9
42002	26.0N	093.5W		7.5	47.7	44.0	0.9			5.1	5.2	29.0	47.1	12.2	0.7	0.1	0.6
42003	26.0N	085.9W	3.8	17.3	67.4	15.1	0.3			7.7	17.8	42.6	19.4	2.4	1.7	5.0	3.3
42007	30.1N	088.9W		10.2	57.9	32.0				5.7	6.5	11.1	14.0	19.9	18.4	16.6	5.8
42008	28.7N	095.3W		3.1	39.0	56.9	0.9			2.7	12.5	20.2	23.2	30.1	7.7	1.6	2.0
42009	29.3N	087.5W		18.6	61.9	19.5				5.1	7.7	24.4	12.1	16.4	11.4	14.8	10.2
42011	29.6N	093.5W		5.0	46.0	48.6	0.1			3.5	12.9	10.4	21.7	23.4	18.3	7.6	2.1
44003	40.8N	068.5W		13.5	72.1	13.3	1.1			4.4	1.3	1.2	3.1	23.8	36.8	18.4	11.2
44004	38.5N	070.7W		4.9	55.1	38.4	1.6			8.0	3.7	1.9	0.9	16.1	36.2	17.6	15.6
44005	42.7N	068.3W		11.4	60.0	27.6	1.0			5.3	2.7	2.4	2.5	23.2	30.8	16.3	16.7
44007	43.5N	070.1W		10.6	53.3	35.8	0.3			9.4	2.8	2.5	2.9	15.0	35.8	12.2	19.5
44008	40.5N	069.4W		4.5	52.9	42.7				5.8	1.9	1.1	3.5	22.7	33.5	18.1	13.5
45001	48.0N	087.6W		11.9	77.0	11.1				6.0	9.8	7.1	11.8	17.3	18.9	24.2	5.6
45002	45.3N	086.3W		14.9	61.1	23.5	0.5			18.4	9.3	3.2	7.0	9.3	34.4	10.5	7.9
45003	45.3N	082.8W		12.6	67.0	20.1	0.3			4.4	3.0	4.1	6.4	29.7	15.3	20.6	16.5
45004	47.2N	086.5W		15.3	73.6	11.1				7.7	7.9	6.8	12.9	17.6	18.9	13.4	12.8
45005	41.7N	082.5W		15.5	68.8	15.8				9.5	9.6	7.3	6.1	19.3	24.4	19.7	4.2
45006	47.3N	090.0W		16.2	74.7	9.2				4.8	16.9	7.9	6.8	16.3	32.8	11.2	3.4
45007	42.7N	087.1W		15.4	64.6	19.9	0.1			11.9	6.8	5.8	10.0	27.8	24.5	8.3	5.0
45008	44.3N	082.4W		18.5	65.2	16.3				11.0	5.8	4.7	7.4	29.0	14.0	11.2	17.0
45009	41.6N	082.0W		17.6	55.5	26.8	0.1			13.3	6.9	6.3	3.2	24.2	21.5	15.3	7.4
46001	56.3N	148.3W		11.1	55.0	33.7	0.1			7.3	5.6	7.8	15.4	13.8	12.7	29.9	7.5
46002	42.5N	130.3W		2.9	36.8	58.3				20.9	0.2			0.7	9.6	40.2	28.3
46003	51.9N	155.7W		2.0	28.0	66.5	3.5			4.9	0.2		1.5	12.7	25.3	30.1	21.3
46004	51.0N	136.0W		5.0	43.5	50.5	1.1			5.4	2.0	1.8	4.7	18.9	28.4	11.9	26.9
46005	46.1N	131.0W		0.5	26.7	64.6	6.2			3.4	0.3	0.1	0.1	6.6	33.8	31.8	23.8
46006	40.7N	137.7W		2.7	23.5	69.8	3.9			18.5	4.0	0.4	0.6	3.8	25.1	25.6	22.6
46010	46.2N	124.2W		4.7	51.0	39.5	0.8			14.6	1.4	1.2	1.7	13.5	23.2	14.2	30.2
46011	34.9N	120.9W		5.1	20.6	67.9	6.3			10.9	0.5			0.3	0.9	3.0	84.5
46012	37.4N	122.7W		3.2	50.8	45.0	0.9			2.1				0.3	2.0	16.9	78.7
46013	38.2N	123.3W		1.2	19.4	58.2	21.2			0.4	<.05			0.3	2.4	23.0	73.8
46014	39.2N	124.0W		2.7	16.9	53.4	26.5	0.4		25.4	0.4	0.3	2.3	2.1	1.3	1.5	66.7
46016	63.3N	170.3W		9.1	47.5	42.1	1.2			1.4	13.6	15.8	15.2	8.2	6.4	20.0	17.4
46017	60.3N	172.3W		9.2	54.4	33.1	3.3			14.4	7.4	13.9	10.9	6.3	27.3	18.7	1.0
46019	57.2N	170.3W		23.8	58.7	17.5				15.5	4.0	5.6	15.1	16.3	8.3	17.1	16.3
46022	40.8N	124.5W		8.8	49.2	35.8	6.3			65.9	7.3	1.4	1.8	4.9	2.9	1.5	12.3
46023	34.3N	120.7W		1.5	9.7	58.7	30.0			5.3	0.1	1.0	0.1			2.1	91.3
46024	32.8N	119.2W		7.5	26.3	62.5	3.7			0.6	0.2	1.2	1.6	2.4	2.2	13.6	78.3
46025	33.6N	119.0W		25.7	63.4	10.8				3.8	1.5	3.5	7.4	9.6	18.8	46.6	17.4
46026	37.8N	122.7W		3.4	45.0	51.6				1.2	0.3	0.3		0.3	3.3	38.1	56.5
51001	23.4N	162.3W			6.4	93.6					39.9	60.1					
CSBF1	29.7N	085.4W	0.2	31.2	62.3	6.5				5.7	13.8	10.4	6.4	19.2	19.4	21.3	8.7
DBLN6	42.6N	079.5W	3.2	13.8	52.3	33.2	0.7			7.9	3.6	0.6	5.5	26.1	44.3	10.9	2.5

JULY 1983			% FREQUENCY OF WIND SPEEDS (<4 KTS)								% FREQUENCY OF WIND SPEEDS (4-10 KTS)								% FREQUENCY OF WIND SPEEDS (11-21 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W	0.4	0.2	0.2		0.4	1.0	0.9	1.1	3.5	1.8	1.0	1.9	4.4	4.9	6.9	2.8	3.8	8.3	9.8	1.8	8.0	24.6	5.0	1.9
41002	32.3N	075.3W	0.1	0.2	0.1	1.2	1.7	0.5	0.2		3.3	6.9	3.1	2.3	7.6	21.2	10.4	1.7	0.8	3.4	7.9		0.9	19.1	6.3	0.3
41006	29.3N	077.3W	0.1	<.05	0.6	1.5	3.3	2.0	1.9	0.6	4.9	7.1	7.1	3.8	20.8	12.6	9.2	1.0	1.6	2.5	6.1	2.6	1.5	6.5	2.2	0.2
42001	25.9N	089.7W	1.8	2.4	2.2	1.9	0.8	1.7	1.0	1.1	6.3	10.3	23.0	9.9	2.8	0.6	0.9	2.8	0.4	1.2	13.8	13.1	1.3			
42002	26.0N	093.5W	1.6	0.8	1.6	2.1	1.4	0.2	0.1	<.05	2.7	3.9	15.1	15.8	9.2	0.5		0.5	0.8	0.5	12.0	28.4	1.6	<.05		<.05
42003	26.0N	085.9W	1.8	2.2	4.9	2.4	1.2	1.3	1.0	1.2	4.4	11.3	20.7	14.1	0.5	0.3	4.4	2.0	0.1	2.5	9.0	2.9	0.4	<.05		0.1
42007	30.1N	088.9W	2.4	0.6	0.9	1.1	1.4	3.2	1.6	0.5	3.0	3.8	5.1	8.3	15.2	11.8	8.6	3.3	0.6	4.0	5.7	4.6	3.2	3.4	8.4	2.1
42008	28.7N	095.3W	0.3	0.5	0.3	0.2	0.6	0.8	0.1	0.2	4.4	11.7	20.0	11.2	5.4	1.5	1.5	0.5	0.7	11.3	15.4	19.2	1.5			0.3
42009	29.3N	087.5W	2.1	1.4	3.1	1.3	2.5	2.9	2.4	3.0	3.0	4.8	8.4	10.6	12.4	7.7	10.3	5.8		1.5	8.9	8.4	1.5	0.8	4.3	2.2
42011	29.6N	093.5W	0.8	0.4	0.7	0.6	1.5	0.5	1.3	0.3	2.5	4.0	6.6	10.9	8.9	6.2	5.2	1.7	0.2	8.4	3.1	10.2	13.0	11.6	2.1	0.1
44003	40.8N	068.5W	1.1	0.4	0.2	0.4	3.3	3.5	2.7	1.5	2.2	0.4	0.2	1.8	17.4	29.4	12.8	7.8	1.1	0.1	0.6	0.7	3.1	11.3	2.1	1.7
44004	38.5N	070.7W	0.5	0.3	0.7	0.1	1.1	0.5	1.2	1.4	5.3	2.5	0.6	0.4	8.7	20.5	8.2	8.8	2.1	0.8	0.6	0.4	7.3	15.2	7.2	4.7
44005	42.7N	068.3W	0.9	<.05	0.5	0.9	1.8	2.7	2.3	2.4	2.3	2.4	1.6	1.5	12.1	17.8	13.7	8.7	2.1	0.3	0.3	0.2	9.3	10.4	4.6	4.6
44007	43.5N	070.1W	1.8	0.7	0.8	0.5	1.8	2.2	2.2	1.6	6.2	1.4	1.9	2.4	6.8	13.3	9.4	12.2	1.9	0.6			6.7	20.3	0.6	5.7
44008	40.5N	069.4W	0.4	0.6	0.2	0.6	0.8	0.6	1.0	0.4	4.2	1.2	0.7	1.7	9.0	16.7	10.2	10.0	1.2	1.0	0.2	1.2	12.9	16.2	6.9	3.1
45001	48.0N	087.6W	0.9	1.7	1.3	1.5	1.9	1.7	2.2	0.7	5.1	7.3	5.5	9.2	14.6	14.4	16.4	4.5		0.2	1.1	1.1	0.8	2.8	5.1	1.0
45002	45.3N	086.3W	0.3	1.8	1.2	1.8	2.4	3.6	1.7	1.1	11.2	6.7	2.5	3.7	4.3	22.1	8.8	5.8	6.9				2.4	11.1	3.0	0.7
45003	45.3N	082.8W	0.5	1.3	0.5	0.4	3.2	3.1	2.8	1.6	2.7	2.7	3.0	4.2	19.4	12.4	13.6	10.2	1.1	<.05	0.5	0.3	7.3	2.2	4.0	4.7
45004	47.2N	086.5W	1.6	0.8	2.7	1.7	2.4	1.9	3.2	1.1	5.7	6.7	5.4	10.8	13.2	12.7	8.6	10.1	0.5	0.6	0.3	0.4	2.8	4.3	1.6	1.6
45005	41.7N	082.5W	1.3	1.8	1.3	1.1	1.9	4.3	2.8	0.9	6.6	5.9	5.4	4.8	13.8	16.2	14.9	2.9	3.4	1.8	0.5	0.2	3.6	3.8	2.0	0.4
45006	47.3N	090.0W	1.9	2.2	1.4	1.6	3.0	2.6	1.8	1.6	2.6	13.5	6.1	5.0	12.6	24.6	8.3	1.6		1.1	0.4	0.2	0.7	5.6	1.1	
45007	42.7N	087.1W	2.0	2.1	2.3	2.2	1.7	2.1	1.8	1.2	3.8	3.9	3.4	7.2	19.3	18.2	6.3	3.1	5.8	0.8	0.1	0.6	6.8	3.9	1.1	0.7
45008	44.3N	082.4W	2.2	2.0	2.1	2.0	2.1	1.7	2.3	3.2	7.1	3.8	2.6	5.3	22.5	10.7	6.2	7.3	1.7				0.1	1.6	0.7	4.4
45009	41.6N	082.0W	3.5	1.2	2.1	1.0	2.6	1.8	2.3	2.9	5.3	5.5	3.3	1.5	10.5	15.6	10.2	3.6	4.3	2.2	0.9	0.6	11.1	4.1	2.8	0.9
46001	56.3N	148.3W	1.3	1.7	2.0	1.0	2.1	1.6	1.1	0.5	6.1	3.2	2.0	9.0	8.7	9.9	9.4	6.6		0.7	3.7	8.3	3.0	1.3	19.3	0.4
46002	42.5N	130.3W	0.6	0.1				0.3	1.1	0.8	4.7	<.05				3.4	15.1	15.5	15.7	0.1			0.7	5.9	24.0	12.0
46003	51.9N	155.7W	0.9	<.05			0.3	0.1	0.3	0.4	4.4	0.2		0.6	2.6	6.9	6.0	7.1	3.4			0.6	9.0	16.0	22.9	13.9
46004	51.0N	136.0W	0.6	0.6	0.7	0.3	0.4	1.1	1.0	0.2	1.3	0.1	0.4	3.7	10.7	9.5	7.7	10.0	3.5	1.3	0.7	0.6	6.8	17.7	3.3	16.6
46005	46.1N	131.0W	0.1	0.1				0.1	0.1		1.2	0.1	0.1	<.05	2.3	7.6	11.0	5.5	2.0			<.05	4.4	23.9	17.1	17.0
46006	40.7N	137.7W	0.2	0.3	0.3	0.6	0.7	0.2	0.2		3.4	1.6		<.05	1.3	2.5	6.3	8.5	14.6	2.1	0.1		1.0	21.0	17.7	13.3
46010	46.2N	124.2W	0.8	0.2	0.2	1.1	1.9	1.2	2.1	1.2	0.8	1.1	1.0	0.7	5.2	13.3	7.1	13.9	5.1				5.6	8.6	5.1	15.1
46011	34.9N	120.9W	0.6	0.4			0.3	0.4	0.9	2.4	3.8	<.05				0.4	2.1	14.4	6.0							61.0
46012	37.4N	122.7W						0.2	1.7	1.4	0.5				0.3	1.9	12.8	35.4	1.8						2.5	41.0
46013	38.2N	123.3W						0.1	0.6	0.4	0.3	<.05			0.3	2.3	10.1	6.3	0.1						11.2	46.8
46014	39.2N	124.0W	1.2	0.2	0.1	0.4	0.2	0.2	0.1	0.3	6.1	0.3	0.1	1.7	1.4	1.0	1.4	5.0	14.2			0.1	0.4	0.1		38.6
46016	63.3N	170.3W		0.1	0.7	1.2	0.8	0.5	2.4	3.3	1.0	5.4	8.6	4.1	4.1	5.4	10.6	0.3	0.4	7.7	6.5	9.3	2.9	2.5	7.0	5.8
46017	60.3N	172.3W	1.6	0.5	1.3			3.6	2.4		8.8	5.1	8.2	3.8	1.2	14.7	11.6	1.0	4.1	1.8	3.9	6.1	3.5	9.1	4.7	
46019	57.2N	170.3W	9.5	3.2		1.6	4.8		1.6	3.2	6.0	0.8	5.6	4.4	8.3	8.3	12.3	13.1				9.2	5.2		3.2	
46022	40.8N	124.5W	2.5	1.2	0.7	0.9	0.5	0.4	0.5	1.9	27.9	5.6	0.7	0.9	3.8	2.1	0.9	7.3	30.3	0.5			1.8	0.4	0.2	2.7
46023	34.3N	120.7W		<.05	0.1	0.1			0.7	0.5	1.6	<.05	0.4				1.3	6.5	2.6		0.5				0.1	55.5
46024	32.8N	119.2W	0.2	0.2	0.7	1.1	1.2	1.0	1.9	1.1	0.1		0.5	0.5	1.2	1.2	9.3	13.5	0.2						2.4	59.9
46025	33.6N	119.0W	1.7	1.1	1.7	3.2	4.6	4.7	6.0	2.7	1.3	0.4	1.9	4.2	5.2	6.0	33.8	10.5							6.7	4.1
46026	37.8N	122.7W	0.8	0.3	0.3			0.1	1.6	0.4	0.4	<.05			0.3	3.2	22.2	18.8							14.3	37.3
51001	23.4N	162.3W										2.4	3.9							37.8	56.1					
CSBF1	29.7N	085.4W	3.6	6.1	2.9	2.9	3.4	4.6	3.1	4.3	1.9	7.7	6.8	3.5	10.6	13.4	13.9	4.3		<.05	0.6		0.1	1.4	4.3	<.05
DBLN6	42.6N	079.5W	1.8	1.5	0.3	2.6	4.4	2.1	1.6	0.3	3.3	1.2	0.1	2.9	20.7	15.8	7.3	1.1	3.4	0.9				26.0	1.9	1.0

JULY 1983			% FREQUENCY OF WIND SPEEDS (22- 33 KTS)								% FREQUENCY OF WIND SPEEDS (34-47 KTS)								% FREQUENCY OF WIND SPEEDS (>47 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W					2.4	2.6	0.2	0.1																
41002	32.3N	075.3W						0.4	0.2	<.05																
41006	29.3N	077.3W																								
42001	25.9N	089.7W				0.1																				
42002	26.0N	093.5W			0.1	0.8																				
42003	26.0N	085.9W					0.3																			
42007	30.1N	088.9W																								
42008	28.7N	095.3W			0.1	0.8																				
42009	29.3N	087.5W																								
42011	29.6N	093.5W	0.1							<.05																
44003	40.8N	068.5W		0.1					0.7	0.2																
44004	38.5N	070.7W							0.9	0.7																
44005	42.7N	068.3W								1.0																
44007	43.5N	070.1W	0.2							<.05																
44008	40.5N	069.4W																								
45001	48.0N	087.6W																								
45002	45.3N	086.3W							0.3	0.1																
45003	45.3N	082.8W					0.1	<.05	0.1	<.05																
45004	47.2N	086.5W																								
45005	41.7N	082.5W																								
45006	47.3N	090.0W																								
45007	42.7N	087.1W	0.1																							
45008	44.3N	082.4W																								
45009	41.6N	082.0W	0.1																							
46001	56.3N	148.3W				0.1																				
46002	42.5N	130.3W																								
46003	51.9N	155.7W				0.3	0.9	1.4	0.9																	
46004	51.0N	136.0W				<.05	1.0	<.05																		
46005	46.1N	131.0W						2.2	2.8	1.2																
46006	40.7N	137.7W	0.3					1.4	1.4	0.8																
46010	46.2N	124.2W					0.8	0.1																		
46011	34.9N	120.9W	0.4							5.9																
46012	37.4N	122.7W								0.9																
46013	38.2N	123.3W							1.0	20.2																
46014	39.2N	124.0W	4.8							22.5								0.4								
46016	63.3N	170.3W		0.4		0.5	0.3																			
46017	60.3N	172.3W			0.6	1.0	1.7																			
46019	57.2N	170.3W																								
46022	40.8N	124.5W	5.1				0.8			0.4																
46023	34.3N	120.7W	1.1							28.9																
46024	32.8N	119.2W								3.7																
46025	33.6N	119.0W																								
46026	37.8N	122.7W																								
51001	23.4N	162.3W																								
CSBF1	29.7N	085.4W																								
DBLN6	42.6N	079.5W	0.2					0.3	0.2																	

AUGUST 1983			AIR TEMPERATURE (DEG C)							SEA TEMPERATURE (DEG C)							AIR-SEA TEMPERATURE DIFFERENCE (DEG C)					
BUOY	LAT	LONG	OBS	DAYS	MAX |DY HR	MIN |DY HR	MEAN	OBS	DAYS	MAX |DY HR	MIN |DY HR	MEAN	OBS	DAYS	MAX |DY HR	MIN |DY HR	MEAN				
41001	34.9N	072.9W	741	31	27.8|21 18	21.6|13 08	26.0	744	31	27.5|20 21	23.8|06 19	26.3	744	31	01.6|23 11	-04.4|13 08	-00.4				
41002	32.3N	075.3W	741	31	30.1|20 18	23.5|13 17	27.3	741	31	30.0|25 20	27.6|13 13	28.5	741	31	00.3|20 10	-04.7|16 23	-01.2				
41006	29.3N	077.3W	742	31	30.1|22 19	24.6|03 11	27.9	743	31	30.9|22 22	27.8|15 07	28.8	743	31	00.6|25 15	-04.0|29 05	-00.8				
42001	25.9N	089.7W	722	31	32.1|22 20	27.9|26 16	30.0	677	31	31.7|09 20	29.7|31 22	30.4	744	31	01.0|01 16	-06.4|26 16	-00.5				
42002	26.0N	093.5W	727	31	31.9|01 16	24.6|13 15	29.5	690	31	32.0|10 01	29.0|22 06	30.5	744	31	01.0|12 16	-05.6|16 15	-01.0				
42003	26.0N	085.9W	720	31	31.6|22 22	23.0|30 15	28.8	700	31	31.5|15 18	28.3|31 11	29.9	742	31	01.1|11 17	-06.2|30 15	-01.1				
42007	30.1N	088.9W	735	31	32.3|31 19	23.7|02 19	28.7	734	31	31.3|24 19	27.4|05 10	29.3	744	31	01.7|30 00	-04.3|02 10	-00.6				
42008	28.7N	095.3W	565	24	33.2|15 19	22.6|17 19	27.7	736	31	31.0|30 18	27.0|19 08	28.9	743	31	02.6|19 18	-05.5|17 19	-00.9				
42009	29.3N	087.5W	231	10	29.6|06 20	24.6|02 19	27.9	227	10	28.8|08 19	28.5|02 20	29.3	233	10	00.1|06 00	-04.5|02 19	-01.4				
42011	29.6N	093.5W	717	31	31.7|31 18	22.5|12 18	27.9	[illegible]													
42012	28.1N	085.9W	524	23	31.7|24 21	24.6|14 09	29.0	524	23	31.2|24 21	29.1|14 11	29.9	531	23	00.7|19 21	-04.6|14 09	-00.9				
44003	40.8N	068.5W	743	31	20.1|05 22	13.2|26 03	16.4	737	31	16.5|12 07	11.6|04 10	13.8	743	31	06.4|09 20	-01.0|26 02	02.6				
44004	38.5N	070.7W	743	31	27.7|26 18	20.0|13 23	24.5	744	31	29.2|04 19	26.1|15 09	27.1	744	31	00.2|28 17	-06.0|13 23	-02.6				
44005	42.7N	068.3W	743	31	27.4|29 18	12.7|13 09	17.3	744	31	19.6|09 21	14.1|13 01	16.7	744	31	03.6|21 01	-02.6|13 09	00.6				
44007	43.5N	070.1W	742	31	29.9|20 21	13.1|13 13	17.9	728	31	18.0|07 23	12.7|14 11	16.2	743	31	12.3|20 21	-02.0|29 13	01.7				
44008	40.5N	069.4W	736	31	22.1|06 21	13.4|13 14	18.5	732	31	20.7|09 22	13.4|10 12	17.5	739	31	04.1|02 15	-04.4|13 14	01.0				
45001	48.0N	087.6W	737	31	27.7|27 23	11.1|09 11	16.0	742	31	18.7|31 17	10.9|09 14	14.5	743	31	05.0|07 17	-00.6|29 20	01.5				
45002	45.3N	086.3W	743	31	24.6|20 01	16.4|16 11	20.8	743	31	23.4|05 23	20.0|12 04	21.3	744	31	03.6|20 01	-05.3|09 16	-00.4				
45003	45.3N	082.8W	744	31	23.7|20 02	17.7|09 15	20.2	744	31	22.9|29 20	18.6|11 08	20.3	744	31	03.0|20 02	-05.5|09 15	-00.1				
45004	47.2N	086.5W	733	31	27.1|19 18	13.7|09 15	17.7	737	31	19.9|31 21	13.6|01 12	16.7	740	31	08.6|06 05	-02.9|09 19	01.0				
45005	41.7N	082.5W	744	31	27.2|09 20	18.5|12 07	24.1	737	31	27.4|27 21	22.6|15 13	25.7	744	31	02.5|09 00	-05.9|10 04	-01.6				
45006	47.3N	090.0W	744	31	24.1|27 23	12.6|11 11	17.3	739	31	18.8|01 20	11.6|04 10	13.8	744	31	07.1|07 23	-03.1|14 23	03.5				
45007	42.7N	087.1W	741	31	26.7|20 01	19.2|11 12	22.9	738	31	25.4|20 20	21.3|12 11	23.1	744	31	03.1|20 02	-03.7|11 12	-00.3				
45008	44.3N	082.4W	744	31	25.1|20 01	15.4|29 20	20.8	744	31	23.2|07 22	18.5|12 03	21.0	744	31	03.7|20 01	-05.0|09 20	-00.2				
45009	41.6N	082.0W	734	31	28.7|08 23	17.8|14 11	23.6	743	31	26.8|03 20	22.8|12 14	24.9	743	31	02.9|17 17	-05.6|11 08	-01.3				
46001	56.3N	148.3W	737	31	15.9|26 17	09.3|27 08	13.7	724	31	15.5|03 00	13.2|22 08	14.7	741	31	00.6|30 17	-04.3|27 08	-01.0				
46002	42.5N	130.3W	743	31	18.2|17 22	14.1|13 13	16.3	743	31	18.2|08 23	15.3|10 13	17.0	743	31	00.9|06 17	-03.2|13 19	-01.0				
46003	51.9N	155.7W	457	20	13.5|29 23	10.7|13 15	12.2	456	21	13.0|31 23	11.9|16 17	12.2	457	20	01.1|10 03	-01.4|13 15	00.0				
46004	51.0N	136.0W	742	31	15.7|30 21	12.7|21 17	14.4	737	31	16.2|04 03	14.4|01 01	15.0	742	31	00.4|30 17	-02.3|28 05	-00.6				
46005	46.1N	131.0W	740	31	16.9|27 01	12.9|08 13	15.4	744	31	18.0|27 01	15.7|02 11	16.4	744	31	00.9|27 01	-03.0|08 13	-01.0				
46006	40.7N	137.7W	742	31	19.7|23 22	15.1|03 07	17.0	742	31	17.7|22 22	15.5|02 15	16.5	742	31	02.2|01 20	-00.9|16 22	00.5				
46010	46.2N	124.2W	735	31	19.4|21 21	13.3|29 20	15.4	726	31	18.8|06 23	13.4|13 08	15.4	739	31	04.0|07 20	-02.2|16 22	00.0				
46011	34.9N	120.9W	744	31	19.3|17 20	14.2|21 09	16.0	744	31	18.9|19 22	15.4|04 09	17.4	744	31	01.0|07 01	-02.4|12 16	-00.7				
46012	37.4N	122.7W	743	31	19.1|21 01	13.2|13 14	15.8	743	31	18.8|22 22	14.6|02 09	16.0	743	31	03.1|21 01	-02.5|11 12	-00.2				
46013	38.2N	123.3W	743	31	19.1|21 01	12.3|12 13	15.1	741	31	17.1|23 01	11.0|01 06	14.9	743	31	03.0|03 01	-02.3|15 15	00.7				
46014	39.2N	124.0W	742	31	17.4|28 23	11.2|13 10	14.7	736	31	17.9|31 04	11.0|02 12	14.9	743	31	02.8|01 02	-02.0|31 17	00.6				
46016	63.3N	170.3W	247	31	17.6|17 [illegible]	03.7|24 12	07.4														
46017	69.3N	172.3W	234	31	10.4|19 03	06.6|17 12	07.8														
46022	40.8N	124.5W	742	31	18.6|13 00	12.1|18 15	15.5	741	31	16.9|13 20	13.1|15 21	15.3	744	31	02.5|25 18	-03.3|14 11	00.2				
46023	34.3N	120.7W	744	31	20.7|16 20	14.3|01 10	17.2	739	31	20.2|21 23	14.2|03 17	17.9	744	31	02.2|06 20	-03.4|08 15	-00.7				
46024	32.8N	119.2W	739	31	22.1|19 21	15.7|03 09	18.6	739	31	22.0|17 20	17.8|04 06	20.0	740	31	02.1|06 22	-03.0|20 13	-01.4				
46025	33.6N	119.0W	741	31	23.7|15 22	16.1|04 16	20.3	741	31	24.0|15 23	19.4|02 14	21.7	742	31	02.0|06 21	-03.6|04 11	-01.4				
46026	37.8N	122.7W	726	31	17.9|30 22	11.6|05 17	15.1	726	31	17.6|23 20	13.1|06 05	15.3	726	31	01.8|22 10	-02.5|12 09	-00.2				
CSBF1	29.7N	085.4W	742	31	32.9|25 18	22.9|06 15	27.0														
DBLN6	42.6N	079.5W	740	31	28.9|17 21	14.1|10 10	22.1														

AUGUST 1983			PRESSURE (MB)						WIND SPEEDS (KNOTS)			MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX |DY HR	MIN |DY HR	MEAN	OBS	MAX|DY HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL	
41001	34.9N	072.9W	744	31	1026.4|02 15	1009.4|29 13	1017.8	735	20|12 15	200	8.8	12.6	7.7	10.0	12.6	11.9	10.2	8.9	11.0	
41002	32.3N	075.3W	741	31	1026.7|01 15	1011.0|30 09	1018.4	723	23|12 17	220	6.5	8.3	8.7	8.5	6.2	10.9	9.4	7.0	09.5	
41006	29.3N	077.3W	743	31	1023.7|01 14	1011.4|29 22	1019.1	712	23|24 18	140	6.5	7.9	9.3	8.5	7.6	8.8	7.1	5.8	08.1	
42001	25.9N	089.7W	743	31	1021.6|24 17	1010.4|31 23	1016.9	681	30|27 06	110	7.4	6.3	6.8	7.9	7.2	6.4	6.4	6.8	07.1	
42002	26.0N	093.5W	744	31	1027.6|25 16	1008.2|27 22	1017.0	631	30|27 18	030	10.4	8.4	6.7	8.5	9.0	14.7	13.4	9.0	09.5	
42003	26.0N	085.9W	742	31	1021.5|24 16	1010.4|31 22	1017.1	709	18|10 14	200	5.5	4.6	6.4	6.3	3.9	3.9	3.3	4.0	05.1	
42007	30.1N	088.9W	741	31	1021.7|24 16	1009.9|31 22	1016.9	709	35|29 23	070	7.5	6.0	9.1	11.0	7.8	6.9	9.0	7.7	08.8	
42008	28.7N	095.3W	729	31	1022.1|25 16	1007.1|17 22	1016.3	722	58|18 07	270	16.8	13.1	9.1	9.7	9.6	12.8	10.3	8.3	10.7	
42009	29.3N	087.5W	233	10	1021.1|05 16	1017.6|08 10	1017.3	229	20|03 02	080	4.8	4.8	7.9	9.0	6.1	5.3	4.9	4.8	06.5	
42011	29.6N	093.5W	743	31	1022.1|25 16	1008.0|18 10	1016.5	721	35|18 01	120	7.0	9.1	12.4	13.1	9.1	7.9	7.3	8.1	09.1	
42012	28.1N	085.9W	531	23	1021.6|24 16	1009.5|31 23	1016.4	513	21|26 21	100	7.8	8.2	10.6	9.6	5.8	6.3	8.9	8.1	08.3	
44003	40.8N	068.5W	743	31	1028.7|25 14	1007.2|20 21	1016.0	722	21|13 13	030	6.6	11.2	7.8	7.6	5.9	7.7	6.9	7.0	07.6	
44004	38.5N	070.7W	744	31	1026.3|25 14	1006.0|12 20	1016.2	741	22|12 10	200	10.8	10.1	7.2	10.4	9.1	12.2	10.4	9.7	10.7	
44005	42.7N	068.3W	744	31	1029.5|25 11	999.1|20 21	1015.3	730	24|12 06	120	10.5	11.3	8.6	7.3	9.5	9.2	6.7	9.1	08.9	
44007	43.5N	070.1W	742	31	1029.1|25 12	999.1|20 20	1015.7	718	23|12 08	060	6.7	11.3	7.8	6.2	8.4	6.5	6.3	9.0	08.3	
44008	40.5N	069.4W	737	31	1028.7|25 13	1007.6|20 22	1015.8	725	22|13 07	040	9.2	11.7	10.0	7.7	8.9	9.8	8.2	7.7	09.4	
45001	48.0N	087.6W	742	31	1024.7|09 15	1002.3|08 03	1015.5	714	18|19 17	250	5.2	5.8	7.7	6.1	6.3	6.4	6.8	6.2	06.3	
45002	45.3N	086.3W	743	31	1025.5|24 15	1004.8|11 06	1016.1	731	22|11 11	040	8.8	8.0	6.1	9.1	8.1	9.5	5.7	8.1	08.5	
45003	45.3N	082.8W	744	31	1024.7|24 17	1004.4|08 12	1015.9	724	23|09 00	300	6.5	9.4	9.7	8.8	8.9	7.0	7.0	10.6	08.4	
45004	47.2N	086.5W	739	31	1025.3|24 14	1003.8|08 05	1016.4	726	17|20 00	270	5.9	6.8	7.0	6.4	7.4	6.5	6.7	7.6	06.9	
45005	41.7N	082.5W	744	31	1026.0|24 16	1004.9|11 15	1017.5	731	10|11 04	130	7.8	6.9	5.9	5.9	6.0	7.4	7.4	6.6	06.9	
45006	47.3N	090.0W	744	31	1024.7|24 21	1004.8|08 04	1016.3	694	17|11 04	050	5.4	5.0	5.1	6.1	5.8	7.0	5.1	4.3	05.9	
45007	42.7N	087.1W	743	31	1024.9|24 14	1004.5|11 04	1016.9	715	24|11 14	330	9.2	8.8	6.9	6.7	8.0	7.5	6.9	9.8	08.2	
45008	44.3N	082.4W	744	31	1026.5|24 17	1005.3|22 09	1016.0	720	22|11 14	060	7.3	6.8	10.5	8.9	8.2	7.5	5.9	8.6	08.1	
45009	41.6N	082.0W	743	31	1024.7|24 15	1003.6|11 20	1016.0	712	22|12 00	020	7.7	7.8	6.5	6.6	7.2	7.9	7.8	5.1	07.3	
46001	56.3N	148.3W	737	31	1027.4|04 18	1000.8|25 05	1010.9	735	24|05 12	210	9.6	9.3		10.3	10.3	11.7	10.3	11.9	11.0	
46002	42.5N	130.3W	743	31	1029.5|12 06	1003.8|30 12	1019.2	722	20|13 04	360	14.3	9.8	6.9	8.8	11.7	11.8	9.7	10.7	12.0	
46003	51.9N	155.7W	687	31	1031.6|17 23	1005.2|26 19	1018.2	737	24|05 06	240	8.0	2.0	6.0	7.1	16.2	16.1	14.6	14.0	14.5	
46004	51.0N	136.0W	742	31	1026.3|21 07	990.1|28 14	1016.7	718	25|28 03	260	7.7	11.2	6.1	4.9	10.3	11.5	11.9	8.9	10.8	
46005	46.1N	131.0W	744	31	1027.7|12 05	998.5|29 14	1019.8	743	27|01 22	210	15.0	12.1	10.4	11.2	12.9	15.9	14.6	15.0	14.9	
46006	40.7N	137.7W	742	31	1031.7|11 19	1014.5|30 01	1024.0	741	25|28 03	300	13.1	10.9	6.1	11.0		14.2	12.0	12.7	12.6	
46010	46.2N	124.2W	736	31	1029.4|12 05	1008.3|29 16	1018.2	699	27|28 18	190	10.3	4.6	1.9	3.3	10.9	5.2	4.5	8.8	08.4	
46011	34.9N	120.9W	744	31	1027.8|25 16	1010.7|09 02	1015.4	723	22|23 22	320	9.2	2.4	2.7	1.6	3.0	4.3	3.9	12.0	11.1	
46012	37.4N	122.7W	743	31	1021.8|25 21	1011.9|18 02	1016.2	713	19|05 23	320	5.0	1.5	2.9	5.2	5.4	4.7	5.1	9.5	07.9	
46013	38.2N	123.3W	743	31	1022.0|25 20	1012.1|31 13	1016.5	698	28|03 02	340	2.5	1.0	4.1	5.9	5.0	2.9	10.3	14.7	11.8	
46014	39.2N	124.0W	743	31	1027.9|26 05	1008.5|31 13	1015.6	710	27|01 03	330	9.5	3.3	3.7	10.9	8.2	2.1	4.1	14.3	11.2	
46016	63.3N	170.3W	246	31	1027.8|17 21	981.5|06 03	1009.7	245	29|20 09	250	8.4	12.3	9.5	7.1	7.6	9.8	10.1	7.8	09.4	
46017	69.3N	172.3W	235	31	1026.5|17 21	981.3|06 00	1010.2	227	24|08 06	340	8.3	6.2	10.5	8.5	12.9	10.7	10.2	12.6	10.1	
46022	40.8N	124.5W	744	31	1021.9|05 22	1007.9|31 13	1016.6	731	24|09 14	350	12.4	5.2	4.3	5.4	10.9	7.0	4.5	5.1	10.0	
46023	34.3N	120.7W	744	31	1020.9|21 21	1009.7|09 04	1014.8	739	25|09 08	310	13.1	1.7	2.4	1.2	1.4	3.9	6.6	16.3	15.5	
46024	32.8N	119.2W	739	31	1019.9|21 19	1010.5|14 01	1014.7	732	20|26 04	320	6.2	8.5		3.1	4.0	5.2	7.3	11.8	10.7	
46025	33.6N	119.0W	741	31	1018.5|21 19	1009.2|09 01	1013.6	710	17|15 00	290	3.6	2.4	4.6	4.7	4.3	4.2	6.6	6.8	06.0	
46026	37.8N	122.7W	726	31	1021.5|25 19	1011.7|17 03	1016.2	706	19|17 03	300	3.1	1.0		9.2	6.0	4.6	7.9	10.1	08.3	
CSBF1	29.7N	085.4W	742	31	1022.7|29 15	1010.6|31 22	1017.6	742	19|12 13	280	2.3	2.9	4.3	3.7	4.5	5.7	6.4	2.8	04.6	
DBLN6	42.6N	079.5W	556	24	1022.9|14 12	1004.1|11 23	1015.6	741	34|09 30	290	7.9	7.9	4.0	4.8	4.7	8.8	8.3	6.8	06.9	

AUGUST 1983			WAVE HEIGHTS (METERS)					FREQUENCY OF WAVE HEIGHTS (%)							
BUOY	LAT	LONG	OBS	MAX	DY	HR	MEAN	<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41001	34.9N	072.9W	739	3.5	12	21	1.2	5.2	79.4	12.5	2.7				
41006	29.3N	077.3W	742	3.0	24	17	1.1	9.1	78.8	10.7	1.2				
42001	25.9N	089.7W	577	3.0	27	08	0.6	76.0	22.0	1.7	0.1				
42002	26.0N	093.5W	595	3.0	17	12	0.8	68.5	17.9	10.7	2.6				
42003	26.0N	085.9W	630	1.5	26	09	0.5	62.3	17.6						
42007	30.1N	088.9W	335	1.5	02	23	0.6	72.1	27.8						
42009	29.3N	087.5W	158	1.5	01	02	0.7	60.1	39.8						
44003	40.8N	068.5W	741	3.5	13	10	1.1	26.1	61.4	10.2	2.1				
44004	38.5N	070.7W	742	3.0	12	11	1.2	11.8	73.9	13.7	0.4				
44005	42.7N	068.3W	741	4.0	12	23	1.0	39.0	52.3	5.9	2.1	0.5			
44007	43.5N	070.1W	617	3.0	12	12	0.6	78.4	17.5	3.0	0.9				
44008	40.5N	069.4W	731	3.5	13	09	1.0	32.5	59.9	6.7	0.8				
45001	48.0N	087.6W	574	2.5	08	03	0.7	69.8	25.9	4.1					
45002	45.3N	086.3W	623	3.0	11	11	0.8	54.2	41.2	4.0	0.4				
45003	45.3N	082.8W	505	2.5	11	16	0.7	60.7	35.4	3.7					
45004	47.2N	086.5W	346	2.0	11	00	0.7	60.0	36.4	3.4					
45005	41.7N	082.5W	558	2.0	14	02	0.7	60.4	36.1	1.3					
45006	47.3N	090.0W	172	1.5	08	07	0.6	80.2	19.7						
45007	42.7N	087.1W	586	3.5	11	23	0.8	56.0	38.7	4.1	1.0				
45008	44.3N	082.4W	594	3.0	14	14	0.7	65.3	30.9	3.5	0.1				
45009	41.6N	082.0W	380	2.0	12	02	0.6	80.4	17.7	1.8					
46001	56.3N	148.3W	734	4.0	26	06	1.7	1.6	54.3	38.4	5.4	0.1			
46002	42.5N	130.3W	443	4.5	29	16	1.8		46.9	45.5	5.6	1.8			
46003	51.9N	155.7W	739	4.0	15	14	1.9	0.8	44.6	40.0	13.9	0.6			
46004	51.0N	136.0W	742	7.0	28	29	1.8	1.6	54.9	34.2	6.1	2.0	0.9		
46005	46.1N	131.0W	743	5.0	29	01	1.5	2.4	70.2	23.6	1.6	2.0			
46006	40.7N	137.7W	742	4.0	29	16	1.4	2.1	76.7	15.4	5.0	0.5			
46010	46.2N	124.2W	727	3.5	26	20	1.3	9.9	75.5	12.5	2.0				
46011	34.9N	120.9W	743	2.5	04	11	1.4	3.7	76.1	21.1					
46012	37.4N	122.7W	741	3.0	01	12	1.4	0.9	73.6	25.2	0.1				
46013	38.2N	123.3W	740	3.0	01	01	1.6	0.6	61.2	33.5	4.5				
46014	39.2N	124.0W	742	3.0	16	04	1.4	13.4	59.0	27.2	0.2				
46022	40.8N	124.5W	744	3.0	15	07	1.5	9.4	56.3	32.6	1.6				
46023	34.3N	120.7W	742	3.0	04	20	1.5		64.1	35.7	0.1				
46024	32.8N	119.2W	727	2.5	10	08	1.3	0.9	83.7	15.2					
46025	33.6N	119.0W	730	1.5	01	04	0.8	33.6	66.3						
46026	37.8N	122.7W	723	2.0	01	06	1.0	16.3	81.1	2.4					
DBLN6	42.6N	079.5W	123	0.0	06	00	0.0								30.0

AUGUST 1987			TOTAL FREQUENCY OF WIND SPEEDS (%)							TOTAL FREQUENCY OF WIND DIRECTIONS (%)							
BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W		4.4	43.3	49.7	2.7			4.9	12.7	8.5	8.8	16.2	20.2	17.4	3.2
41002	32.3N	075.3W		3.6	62.9	32.6	0.8			9.6	6.4	2.7	3.4	14.6	39.1	21.0	3.3
41006	29.3N	077.3W		12.4	61.5	25.8	0.3			2.4	1.4	6.8	24.9	21.6	27.1	9.7	6.2
42001	25.9N	089.7W		17.8	65.3	16.2	0.7			8.9	7.9	18.1	27.1	19.6	7.7	4.1	6.7
42002	26.0N	093.5W		10.5	57.1	25.7	6.8			5.7	6.8	13.0	31.9	23.6	8.7	4.8	4.4
42003	26.0N	085.9W	6.9	35.1	57.1	7.8				7.3	7.9	23.9	18.0	13.5	12.4	8.6	8.4
42007	30.1N	088.9W		9.4	56.3	34.0	0.1	0.1		6.1	7.7	8.7	24.5	13.6	14.0	17.4	7.9
42008	28.7N	095.3W		6.6	57.5	30.3	1.9	2.6	1.0	7.8	8.9	12.6	26.0	24.6	10.4	4.6	5.0
42009	29.3N	087.5W		18.3	67.7	14.0				5.0	6.9	16.0	27.1	4.5	11.5	17.2	11.8
42011	29.6N	093.5W	1.2	12.8	58.8	23.7	4.3	0.4		9.6	5.4	7.4	12.6	23.5	22.6	10.4	8.2
42012	28.1N	085.9W		10.1	61.6	28.1				5.3	6.4	10.8	14.2	9.1	13.9	26.6	13.7
44003	40.8N	068.5W		12.5	68.3	19.3				9.8	13.5	6.0	7.1	17.1	28.1	10.3	8.1
44004	38.5N	070.7W		4.2	44.1	51.6	0.1			16.2	11.8	2.4	8.2	9.4	30.6	14.0	7.4
44005	42.7N	068.3W		8.8	59.3	31.6	0.4			7.6	10.9	4.1	10.2	16.3	23.3	17.5	10.1
44007	43.5N	070.1W		9.3	62.7	27.6	0.4			9.1	9.0	7.0	5.8	15.6	29.0	13.0	11.5
44008	40.5N	069.4W		6.5	55.6	37.6	0.1			13.1	12.8	7.4	7.4	14.9	26.1	9.9	8.4
45001	48.0N	087.6W		16.2	77.2	6.6				7.8	7.6	4.1	9.2	14.1	22.5	22.7	12.0
45002	45.3N	086.3W		12.7	57.4	30.1	0.1			16.9	9.5	4.0	3.6	10.0	38.0	7.4	10.8
45003	45.3N	082.8W		12.3	58.8	28.7	0.4			7.9	7.3	4.5	11.4	21.9	15.3	16.3	15.5
45004	47.2N	086.5W		15.6	70.0	14.4				9.8	6.4	3.6	7.8	18.2	18.7	14.6	20.8
45005	41.7N	082.5W		21.1	62.2	16.7				13.7	16.2	11.8	8.3	12.4	20.5	12.6	4.5
45006	47.3N	090.0W		25.4	67.0	7.6				6.1	8.0	9.8	10.0	12.1	29.1	16.8	8.1
45007	42.7N	087.1W		10.1	64.9	24.8	0.3			20.4	15.1	5.8	6.6	21.3	14.5	7.1	9.2
45008	44.3N	087.4W		11.7	67.2	20.7	0.4			13.4	10.1	4.3	7.9	27.5	11.5	8.8	16.4
45009	41.6N	082.0W		20.9	54.9	24.4	0.3			15.2	18.6	7.8	4.8	20.2	15.0	9.9	4.5
46001	56.3N	148.3W		1.8	43.5	53.7	1.0			5.2	0.4		0.7	6.5	23.9	39.5	23.8
46002	42.5N	130.3W		5.0	28.1	66.9				35.9	2.4	0.9	1.5	8.3	8.5	15.4	27.1
46003	51.9N	155.7W		0.5	21.0	74.5	3.9			0.2	<.05	1.5	1.5	2.7	21.5	54.7	17.9
46004	51.0N	136.0W		4.9	44.3	48.7	2.1			2.4	5.6	2.9	0.2	11.0	25.0	36.2	16.6
46005	46.1N	131.0W		1.6	17.4	75.2	5.8			4.8	5.8	1.2	4.7	12.7	14.4	22.1	34.3
46006	40.7N	137.7W		1.2	31.6	65.2	1.6			39.1	8.7	1.7	<.05		8.4	18.5	24.6
46010	46.2N	124.2W		17.5	49.5	31.5	1.3			32.6	1.5	1.1	2.8	9.4	8.7	10.1	33.9
46011	34.9N	120.9W		7.2	36.7	53.7	0.4			15.8	0.6	0.5	0.2	0.1	0.6	4.4	77.8
46012	37.4N	122.7W		15.4	57.5	27.1				2.9	0.3	1.5	8.4	10.6	3.9	7.7	64.7
46013	38.2N	123.3W		13.5	30.4	49.0	7.2			1.4	0.1	0.7	8.2	7.3	2.9	18.7	60.6
46014	39.2N	124.0W		13.8	35.4	44.1	6.2			26.2	3.2	2.4	11.2	9.6	1.1	1.3	44.8
46016	63.3N	170.3W		9.8	53.1	36.5	0.8			4.7	8.3	15.5	3.2	2.4	15.3	29.3	21.3
46017	60.3N	172.3W		4.0	51.5	43.2	1.3			7.0	13.9	19.7	4.1	1.8	35.8	13.9	3.9
46022	40.8N	124.5W		15.6	35.4	47.9	1.1			58.4	8.4	3.7	4.5	9.3	6.0	3.5	6.2
46023	34.3N	120.7W		2.6	16.4	72.5	8.5			7.5	0.1	0.3	0.2	0.2	0.7	3.8	87.1
46024	32.8N	119.2W		3.3	43.9	52.9				0.6	0.3		0.5	1.7	2.4	14.4	80.3
46025	33.6N	119.0W		25.4	67.4	6.6				4.0	6.8	0.6	3.5	9.5	10.3	42.4	29.0
46026	37.8N	122.7W		12.9	55.5	31.6				0.6	<.05		1.4	12.6	9.1	33.2	43.0
CSBF1	29.7N	085.4W	0.0	39.4	55.8	4.9				5.4	16.2	11.9	7.5	7.0	22.3	21.8	7.8
DBLN6	42.6N	079.5W	4.6	23.3	50.6	15.2	2.6	0.1		12.9	10.8	6.2	14.6	14.0	22.8	11.6	6.9

AUGUST 1987			% FREQUENCY OF WIND SPEEDS (<4 KTS)								% FREQUENCY OF WIND SPEEDS (4-10 KTS)								% FREQUENCY OF WIND SPEEDS (11-21 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W	0.5	0.6	0.5	0.8	0.7	0.6	0.5		2.4	4.2	7.0	4.1	5.0	10.1	7.9	2.5	1.9	7.1	1.0	3.9	9.7	16.5	9.0	0.5
41002	32.3N	075.3W	0.9	0.4	0.1		0.9	0.9	0.3	<.05	6.5	4.7	2.0	2.9	11.8	19.1	13.0	2.9	2.2	1.2	0.6	0.5	1.8	10.5	7.5	0.3
41006	29.3N	077.3W	0.5	0.5	1.2	3.2	2.1	0.9	4.4	1.6	1.6	0.5	3.3	14.1	16.2	17.3	4.4	4.1	0.2	0.4	2.1	7.7	3.3	8.9	2.6	0.5
42001	25.9N	089.7W	1.5	1.3	3.1	4.1	3.0	2.1	0.9	1.7	5.3	5.9	12.9	17.7	12.7	4.0	2.6	4.3	2.1	0.7	1.8	4.8	3.8	1.6	0.6	0.7
42002	26.0N	093.5W	0.3	1.2	2.1	2.6	1.9	1.0	0.8	0.6	3.2	3.2	9.8	11.2	12.6	3.1	1.5	2.5	1.8	1.8	0.8	6.8	8.8	2.0	2.5	1.3
42003	26.0N	085.9W	3.3	3.1	2.0	3.9	6.0	6.3	4.7	3.8	2.3	4.4	20.6	12.0	4.4	5.7	3.7	4.3	1.7	0.3	1.3	2.1	1.1	0.4	0.2	0.7
42007	30.1N	088.9W	1.0	1.4	1.0	0.5	1.9	2.2	1.1	0.6	3.6	3.5	4.4	9.3	8.5	10.3	10.7	5.9	1.5	2.8	3.3	14.7	3.2	1.4	5.6	1.5
42008	28.7N	095.3W	0.2	0.6	0.8	1.9	2.0	0.7	4.7	0.6	4.4	3.9	7.2	15.4	13.4	6.0	2.9	4.2	1.3	3.0	4.0	9.5	6.8	2.3	0.8	0.6
42009	29.3N	087.5W	2.2	2.6	1.7	1.9	1.4	1.1	3.1	4.4	2.5	4.3	10.7	16.5	2.7	10.4	13.9	6.8	0.3		3.6	0.7	0.3		0.3	0.7
42011	29.6N	093.5W	1.2	0.3	0.3	0.9	4.5	1.4	2.9	1.0	7.2	3.9	3.5	6.0	12.1	16.3	4.6	5.0	1.2	1.2	2.3	3.3	5.7	5.1	2.8	2.1
42012	28.1N	085.9W	0.7	0.6	0.5	0.5	1.9	1.8	2.1	2.0	3.5	4.3	4.6	8.4	6.5	11.1	15.8	7.5	1.0	1.5	5.5	5.3	0.8	1.1	8.6	4.2
44003	40.8N	068.5W	1.9	1.2	0.8	0.6	3.2	2.0	1.6	1.2	6.3	5.0	3.7	5.0	13.1	22.1	7.8	5.4	1.6	7.4	1.5	1.6	0.8	4.0	1.0	1.5
44004	38.5N	070.7W	0.6	0.6	0.7	0.5	0.6	0.6	0.3	0.4	5.9	5.3	0.9	3.9	6.5	11.4	6.7	3.4	9.7	5.9	0.8	3.8	2.2	10.6	7.0	3.5
44005	42.7N	068.3W	0.8	0.6	1.1	1.2	0.5	1.0	2.3	1.3	3.6	4.9	1.5	7.4	9.7	13.9	13.4	4.8	3.3	5.1	1.4	1.4	6.1	8.4	1.8	3.9
44007	43.5N	070.1W	0.3	0.8	1.2	0.7	1.3	1.9	2.2	0.9	6.0	3.5	3.8	4.8	10.1	16.6	9.4	6.4	2.8	4.5	2.0	0.3	4.2	8.5	1.3	4.0
44008	40.5N	069.4W	1.1	0.7	0.4	0.8	0.6	1.5	0.6	0.7	6.8	4.9	3.6	4.9	9.9	12.7	7.3	5.6	5.2	7.1	3.4	1.7	4.4	12.0	2.0	2.1
45001	48.0N	087.6W	2.3	1.4	1.1	2.0	1.3	3.3	3.1	1.8	5.1	6.0	1.7	6.9	12.7	17.9	17.1	9.8	0.4	0.1	1.3	0.4	0.1	1.4	2.5	0.5
45002	45.3N	086.3W	0.8	1.5	1.4	0.9	1.6	1.7	2.5	2.4	10.4	6.5	2.1	1.4	6.2	21.6	4.4	4.5	5.7	1.4	0.5	1.3	2.2	14.6	0.4	3.9
45003	45.3N	082.8W	0.8	0.3	0.8	1.9	1.9	2.2	3.6	0.9	6.5	3.9	1.9	5.2	13.0	11.6	9.3	7.2	0.6	3.1	1.7	4.3	6.9	1.5	3.5	7.1
45004	47.2N	086.5W	2.2	1.2	0.8	1.2	1.9	3.6	2.5	2.2	7.2	3.7	1.8	5.7	14.3	13.3	9.7	14.3	0.6	1.5	0.9	1.0	2.0	1.8	2.4	4.4
45005	41.7N	082.5W	1.8	3.5	3.1	2.3	3.5	3.4	2.3	1.1	6.8	9.9	7.5	5.5	7.6	13.3	7.0	2.7	3.0	2.7	1.1	0.5	1.4	3.9	3.3	0.6
45006	47.3N	090.0W	1.9	2.2	3.4	2.1	2.8	4.0	5.4	3.5	3.6	4.6	6.3	7.5	9.0	20.5	10.9	4.5	0.5	1.1	0.1	0.4	0.3	4.6	0.5	0.1
45007	42.7N	087.1W	0.9	0.9	0.6	0.6	2.4	2.5	1.5	0.7	13.0	9.2	4.4	5.7	14.4	9.6	4.1	4.5	6.4	5.0	0.9	0.2	4.5	2.4	1.4	3.8
45008	44.3N	087.4W	1.6	0.9	0.4	0.9	1.5	1.7	2.2	2.5	10.6	6.7	2.6	4.8	21.2	7.6	6.1	7.7	1.3	2.4	1.0	2.2	4.9	2.2	0.6	6.2
45009	41.6N	082.0W	3.5	3.4	2.2	0.8	3.8	2.8	1.7	2.8	7.7	10.4	4.1	3.2	11.0	7.8	5.1	5.2	3.9	4.7	1.5	0.9	5.3	4.4	3.2	0.6
46001	56.3N	148.3W	0.1	0.1			0.2	0.2	0.2	0.9	3.4	0.1		0.3	4.0	8.1	19.3	8.3	1.6	0.1		0.4	2.2	15.2	20.0	14.2
46002	42.5N	130.3W	1.1	0.1		0.7	0.5	0.2	1.1	1.6	3.0	1.2	3.8	0.6	1.9	2.8	7.7	10.2	31.8	1.0	0.1	0.6	6.0	5.4	6.6	15.4
46003	51.9N	155.7W	0.1	<.05	0.2			<.05	0.1	<.05			1.3	1.3	1.6	3.5	9.1	4.4	0.1			0.2	1.2	15.1	44.7	13.3
46004	51.0N	136.0W		<.05	0.4	0.1	0.3	1.2	2.0	0.7	2.1	2.2	2.5	0.1	6.4	9.3	11.8	10.0	0.3	3.3			3.7	14.3	21.1	6.1
46005	46.1N	131.0W		0.4	0.1	0.7	0.2	0.2			0.7	1.5	0.3	1.3	4.1	2.8	4.0	2.6	4.1	3.8	0.8	2.7	8.0	7.9	16.2	31.7
46006	40.7N	137.7W	0.5	0.1						0.6	10.3	4.2	1.3			1.6	7.1	7.4	26.9	4.3	0.4	<.05		6.6	11.0	16.0
46010	46.2N	124.2W	1.7	0.5	1.0	1.6	2.7	2.5	3.8	3.7	14.8	1.0	0.1	1.2	2.3	6.0	6.1	18.3	16.1	<.05			3.1	0.1	0.2	11.8
46011	34.9N	120.9W	1.7	0.4	0.3	0.1	0.1	0.3	2.1	2.0	7.8	0.2	0.2	<.05		0.3	2.2	27.4	6.3							47.4
46012	37.4N	122.7W	1.2	0.3	1.0	3.7	2.7	1.5	3.2	1.8	1.4		0.5	3.9	7.6	2.0	3.7	38.3	0.3			0.8	0.2	0.3	0.9	24.6
46013	38.2N	123.3W	1.1	0.1	0.3	2.4	2.3	2.1	3.4	1.7	0.3		0.5	5.3	5.0	0.8	5.5	13.1				0.6			9.7	38.7
46014	39.2N	124.0W	3.5	1.9	1.7	2.0	1.1	1.0	0.8	1.8	11.5	1.4	0.6	3.7	6.3	0.1	0.4	12.1	11.1		0.1	4.6	2.0		0.1	26.2
46016	63.3N	170.3W	1.1	0.1	1.9	0.8	0.3	1.4	1.9	2.1	2.1	3.5	8.5	1.3	1.8	7.3	14.3	14.2	1.4	4.6	4.0	1.0	0.3	6.4	12.6	5.0
46017	60.3N	172.3W	1.2	0.4	0.4			1.0		0.1	4.6	11.2	8.1	2.9	0.4	14.2	8.6	1.4		2.2	11.1	1.2	1.3	19.8	5.3	2.2
46022	40.8N	124.5W	3.0	3.2	1.7	1.7	1.4	1.2	1.3	2.1	14.0	4.6	1.8	2.4	3.4	3.4	2.2	3.6	41.0	0.6	0.1	0.3	4.1	1.3		0.5
46023	34.3N	120.7W	0.2	0.1	0.3	0.2	0.2	0.4	0.3	0.7	2.2					0.1	3.3	10.8	4.8					0.1	0.2	67.4
46024	32.8N	119.2W	0.1			0.2	0.7	0.4	1.1	0.8	0.4	0.3		0.3	1.1	2.0	10.4	29.0	0.1					<.05	2.4	50.3
46025	33.6N	119.0W	2.4	0.7	0.4	1.5	4.0	3.8	6.9	5.6	1.5	0.1	0.3	1.8	5.4	6.4	32.3	20.0				0.1		0.1	3.2	3.3
46026	37.8N	122.7W	0.5	<.05		0.2	2.3	2.4	5.1	2.2	0.1			0.3	9.2	6.6	19.1	20.2				0.8	1.0	0.1	9.0	20.6
CSBF1	29.7N	085.4W	4.3	11.0	4.3	3.6	2.4	4.2	4.1	5.5	1.1	5.2	7.6	3.9	4.5	16.5	14.7	2.2					0.1	1.6	3.1	0.1
DBLN6	42.6N	079.5W	2.9	2.6	2.6	3.0	3.3	4.2	1.9	2.8	7.3	5.1	3.5	11.4	10.5	11.9	5.8	2.8	1.8	2.8	0.1	<.05	0.1	5.5	3.7	1.3

AUGUST 1987			% FREQUENCY OF WIND SPEEDS (22- 33 KTS)								% FREQUENCY OF WIND SPEEDS (34-47 KTS)								% FREQUENCY OF WIND SPEEDS (>47 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W		0.8			3.8	1.0		0.1																
41002	32.3N	075.3W						0.7	0.1																	
41006	29.3N	077.3W			0.3																					
42001	25.9N	089.7W			0.3	0.5																				
42002	26.0N	093.5W	0.5	0.5	0.3	1.2	0.4	2.6	1.3																	
42003	26.0N	085.9W																								
42007	30.1N	088.9W						0.1				<.05	0.1													
42008	28.7N	095.3W		0.8		0.1	0.5	0.5			1.4	0.6				0.6		0.1	0.4					0.3	0.2	
42009	29.3N	087.5W																								
42011	29.6N	093.5W			1.1	2.0	1.1	<.05						0.3	0.1											
42012	28.1N	085.9W																								
44003	40.8N	068.5W																								
44004	38.5N	070.7W					0.1	<.05																		
44005	42.7N	068.3W		0.3		0.1																				
44007	43.5N	070.1W		0.3						0.1																
44008	40.5N	069.4W		0.1																						
45001	48.0N	087.6W																								
45002	45.3N	086.3W		0.1																						
45003	45.3N	082.8W					0.1			0.3																
45004	47.2N	086.5W																								
45005	41.7N	082.5W																								
45006	47.3N	090.0W																								
45007	42.7N	087.1W	0.1							0.2																
45008	44.3N	087.4W		0.2	0.2																					
45009	41.6N	082.0W	0.1	0.2																						
46001	56.3N	148.3W					3.1	0.4		0.4																
46002	42.5N	130.3W																								
46003	51.9N	155.7W						2.9	1.8	0.2																
46004	51.0N	136.0W					3.6	0.2	1.4																	
46005	46.1N	131.0W					0.4	3.5	1.4																	
46006	40.7N	137.7W	0.5					0.1	0.5	0.6																
46010	46.2N	124.2W					1.3																			
46011	34.9N	120.9W								0.4																
46012	37.4N	122.7W																								
46013	38.2N	123.3W							0.1	7.1																
46014	39.2N	124.0W	0.2			0.9	0.2			4.9																
46016	63.3N	170.3W		0.1	0.3			0.1	0.3																	
46017	60.3N	172.3W	1.2							0.1																
46022	40.8N	124.5W	0.5			<.05	0.5			0.1																
46023	34.3N	120.7W	0.3							0.2																
46024	32.8N	119.2W																								
46025	33.6N	119.0W																								
46026	37.8N	122.7W																								
CSBF1	29.7N	085.4W																								
DBLN6	42.6N	079.5W	0.9	0.3				1.2	0.1								0.1	<.05								

SEPTEMBER 1983			AIR TEMPERATURE (DEG C)									SEA TEMPERATURE (DEG C)									AIR-SEA TEMPERATURE DIFFERENCE (DEG C)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY	HR	MIN	DY	HR	MEAN	OBS	DAYS	MAX	DY	HR	MIN	DY	HR	MEAN	OBS	DAYS	MAX	DY	HR	MIN	DY	HR	MEAN
41001	34.9N	072.9W	716	30	30.4	08	18	19.6	28	20	25.1	720	30	29.5	08	21	24.3	30	03	26.3	720	30	02.0	08	18	-05.8	15	09	-01.2
41002	32.3N	075.3W	714	30	29.4	07	22	22.0	29	11	26.6	715	30	30.3	10	19	25.7	29	10	28.0	716	30	00.4	05	22	-04.5	21	19	-01.3
41006	29.3N	077.3W	716	30	30.5	11	19	27.2	29	10	27.3	716	30	30.8	11	21	26.8	29	10	28.6	717	30	00.5	05	14	-04.7	13	17	-01.2
42001	25.9N	089.7W	713	30	31.1	01	16	24.4	03	17	28.3	719	30	31.3	01	20	28.0	15	11	29.1	719	30	00.9	15	23	-05.0	03	17	-00.8
42002	26.0N	093.5W	713	30	30.5	06	15	23.7	21	13	28.1	718	30	31.5	14	20	28.3	24	12	29.6	718	30	00.3	06	15	-05.5	21	18	-01.5
42003	26.0N	085.9W	697	30	29.4	02	17	21.0	18	02	27.4	699	30	30.2	01	21	28.1	15	12	29.1	700	30	00.4	13	22	-06.8	18	02	-01.7
42007	30.1N	088.9W	711	30	31.1	01	04	15.0	22	11	25.7	715	30	31.3	01	06	23.9	27	16	27.1	718	30	01.4	13	23	-11.3	22	12	-01.4
42008	28.7N	095.3W	176	08	25.9	27	18	22.2	23	16	24.8	715	30	30.5	03	19	24.6	28	13	27.4	176	08	00.6	27	12	-03.9	23	16	-00.6
42011	29.6N	093.5W	673	30	31.9	02	19	18.9	22	07	25.8																		
42012	29.8N	087.1W	693	30	30.8	08	21	19.8	21	27	26.1	717	30	30.6	01	02	25.8	29	15	28.4	717	30	00.7	08	21	-08.1	21	21	-02.4
44003	40.8N	068.5W	716	30	21.3	07	18	13.8	28	21	16.4	713	30	16.3	07	18	12.6	10	06	14.3	717	30	06.3	07	20	-01.1	02	11	02.1
44004	38.5N	070.7W	714	30	27.4	06	19	17.1	24	00	23.1	718	30	28.4	09	20	24.3	29	23	26.4	718	30	00.0	07	16	-08.8	24	00	-03.3
44005	42.7N	068.3W	718	30	20.9	07	20	12.4	28	16	17.0	718	30	18.8	05	19	14.9	15	11	16.9	718	30	03.3	11	23	-04.1	28	12	00.1
44007	43.5N	070.1W	713	30	27.5	11	21	10.8	28	12	16.5	578	25	18.7	04	16	13.7	18	07	15.7	715	30	11.9	11	21	-04.3	28	12	00.9
44008	40.5N	069.4W	711	30	22.9	07	20	13.5	29	01	18.0	711	30	23.0	13	20	13.8	08	10	18.1	712	30	07.3	08	01	-05.3	14	01	-00.1
45001	48.0N	087.6W	714	30	20.9	03	15	05.6	23	09	14.1	714	30	18.5	02	19	11.3	27	10	15.1	715	30	03.5	29	00	-06.4	23	09	-01.0
45002	45.3N	086.3W	625	28	23.7	05	07	08.6	23	08	17.1	719	30	22.0	01	18	16.5	30	12	19.3	719	30	02.1	10	23	-09.1	22	14	-01.9
45003	45.3N	082.8W	720	30	23.6	05	23	08.0	23	17	16.6	720	30	21.9	01	22	13.4	26	14	18.3	720	30	03.1	09	21	-08.2	23	12	-01.7
45004	47.2N	086.5W	708	30	22.6	03	19	06.3	23	05	14.8	713	30	19.7	03	00	12.0	27	14	15.2	713	30	04.9	29	22	-06.5	23	05	-00.4
45005	41.7N	082.5W	719	30	28.6	10	21	09.8	22	14	20.3	719	30	26.4	03	21	18.8	25	10	22.5	719	30	04.8	18	20	-11.0	22	14	-02.2
45006	47.3N	090.0W	718	30	23.4	02	22	06.0	23	12	13.6	720	30	20.1	02	23	06.7	22	13	12.9	720	30	05.9	28	19	-02.7	06	23	00.8
45007	42.7N	087.1W	719	30	26.3	10	22	08.8	21	15	18.6	719	30	24.0	02	21	16.2	26	08	20.4	720	30	03.2	10	22	-09.7	21	15	-01.8
45008	44.3N	082.4W	719	30	25.7	10	22	09.7	23	12	17.7	719	30	22.7	01	23	15.3	25	09	19.1	719	30	04.4	10	22	-07.1	22	08	-01.5
45009	41.6N	082.0W	715	30	29.5	05	21	07.9	23	12	19.8	716	30	27.1	04	20	18.3	26	12	22.5	719	30	07.0	18	20	-11.4	23	12	-02.7
46001	56.3N	148.3W	716	30	14.2	01	23	03.2	26	00	10.8	675	30	14.8	02	03	10.1	29	00	11.9	717	30	01.7	19	23	-07.2	26	00	-01.2
46002	42.5N	130.3W	719	30	18.1	23	01	13.9	27	12	16.5	718	30	18.3	02	23	16.8	30	13	17.5	719	30	00.5	22	17	-03.2	27	12	-01.0
46003	51.9N	155.7W	719	30	14.2	01	09	08.4	24	03	11.6	720	30	13.4	01	01	11.4	25	15	12.1	720	30	01.7	29	14	-03.3	24	03	-00.5
46004	51.0N	136.0W	720	30	15.3	02	00	08.8	26	13	13.0	720	30	15.3	02	00	13.0	17	01	14.0	720	30	00.8	25	00	-04.6	26	13	-01.0
46005	46.1N	131.0W	715	30	16.7	01	02	12.4	29	08	15.1	718	30	17.2	01	01	15.4	30	09	16.3	718	30	00.5	22	06	-03.4	09	16	-01.2
46006	40.7N	137.7W	718	30	19.5	11	01	15.4	27	13	17.1	720	30	19.5	12	22	16.8	09	15	18.0	720	30	02.3	11	01	-03.1	27	13	-00.9
46010	46.2N	124.2W	704	30	20.9	22	01	09.6	28	13	14.7	705	30	17.9	01	01	11.4	28	16	14.7	707	30	04.2	22	01	-04.0	18	10	00.0
46011	34.9N	120.9W	717	30	20.9	20	20	14.8	04	16	17.0	717	30	20.4	20	20	15.8	05	14	18.0	717	30	01.8	11	16	-03.1	15	11	-01.0
46012	37.4N	122.7W	718	30	21.9	20	11	13.5	18	11	16.4	719	30	18.5	01	23	15.2	16	09	17.1	720	30	06.0	20	11	-03.1	17	13	-00.7
46013	38.2N	123.3W	719	30	20.7	20	20	12.3	18	04	15.7	719	30	17.6	23	22	14.4	12	17	15.8	719	30	05.0	20	23	-02.5	16	05	-00.1
46014	39.2N	124.0W	718	30	21.8	21	04	10.9	17	14	15.1	719	30	18.2	02	00	12.5	14	14	15.2	720	30	06.9	21	04	-02.7	25	04	-00.1
46016	63.3N	170.3W	228	30	08.5	12	00	00.1	22	12	04.7																		
46017	60.3N	172.3W	176	30	09.1	04	21	07.2	23	12	06.3																		
46022	40.8N	124.5W	717	30	19.5	20	23	12.4	29	12	14.7	718	30	16.9	02	22	11.4	19	15	14.0	718	30	05.9	20	11	-01.6	24	10	00.7
46023	34.3N	120.7W	718	30	22.9	12	21	16.1	05	13	18.2	718	30	21.7	12	21	16.5	09	14	19.0	718	30	01.4	12	20	-03.1	30	04	-00.8
46024	32.8N	119.2W	710	30	22.3	13	21	16.0	30	11	19.3	706	30	22.3	13	01	20.1	01	13	20.8	711	30	01.2	20	11	-04.2	30	11	-01.4
46025	33.6N	119.0W	709	30	23.5	11	20	17.1	30	13	20.2	710	30	23.4	17	22	19.6	07	14	21.4	713	30	02.1	11	20	-04.0	30	13	-01.2
46026	37.8N	122.7W	716	30	22.6	20	18	12.7	16	13	16.1	714	30	18.8	03	22	15.6	19	08	16.8	718	30	06.6	20	18	-03.6	16	11	-00.7
46027	41.8N	124.4W	714	30	21.2	21	23	10.5	24	15	13.5	714	30	17.2	01	03	10.2	17	15	12.4	720	30	09.5	21	23	-02.4	24	10	01.1
CSBF1	29.7N	085.4W	615	30	30.4	04	20	19.7	23	01	25.8																		
DPLN6	42.6N	079.5W	635	30	28.7	20	19	06.2	23	06	18.5																		
GLLN6	43.5N	076.3W	268	12	25.3	20	20	09.7	23	09	16.3																		
SRIO1	0.0N	000.0W	343	17	24.8	11	21	11.9	21	10	19.7																		

SEPTEMBER 1983			PRESSURE (MB)									WIND SPEEDS (KNOTS)					MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY	HR	MIN	DY	HR	MEAN	OBS	MAX	DY	HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.9N	072.9W	719	30	1030.2	24	16	1010.4	14	21	1018.3	709	37	28	19	010	16.9	21.0	14.2	8.8	14.3	15.5	10.4	9.5	14.4
41002	32.3N	075.3W	716	30	1028.2	24	16	1009.8	15	11	1018.3	692	24	27	19	020	11.8	14.3	5.6	5.8	7.8	11.0	8.1	6.0	10.7
41006	29.3N	077.3W	716	30	1023.9	24	16	1012.1	02	09	1017.7	653	29	02	15	190	10.4	16.4	8.2	6.1	9.7	11.0	9.3	4.4	10.5
42001	25.9N	089.7W	719	30	1020.9	23	03	1009.8	02	11	1016.3	487	32	03	22	100	12.0	17.0	14.1	11.3	10.4	6.2	7.5	6.2	13.8
42002	26.0N	093.5W	713	30	1022.6	23	17	1010.1	02	23	1016.4	684	33	05	15	150	10.3	14.3	14.2	13.6	12.3	7.4	7.4	9.7	13.2
42003	26.0N	085.9W	699	30	1020.4	25	16	1009.8	02	10	1016.6	686	28	04	01	300	11.6	13.6	11.3	8.9	7.9	9.4	6.9	7.6	10.9
42007	30.1N	088.9W	715	30	1025.7	24	16	1009.4	01	09	1017.5	701	24	05	17	280	11.9	11.3	9.7	7.7	9.1	8.3	10.4	10.7	09.8
42008	28.7N	095.3W	716	30	1025.6	23	16	1009.2	06	00	1016.5	709	37	07	00	150	16.1	13.3	13.0	13.0	13.5	9.0	7.6	8.5	12.9
42011	29.6N	093.5W	711	30	1026.6	23	16	1009.4	01	22	1017.1	708	32	21	15	020	13.3	11.2	11.2	11.0	11.8	10.2	8.5	10.2	11.2
42012	29.8N	087.1W	717	30	1024.8	24	17	1008.9	01	21	1017.1	698	27	10	22	160	11.5	12.3	12.9	8.7	9.4	7.6	10.0	9.7	10.8
44003	40.8N	068.5W	716	30	1031.9	25	14	1006.6	22	17	1018.2	707	22	15	04	010	10.1	10.9	8.7	8.8	7.5	7.0	5.9	7.2	08.2
44004	38.5N	070.7W	718	30	1031.1	25	14	1006.8	22	10	1017.9	712	26	29	10	050	13.0	15.1	13.6	10.9	12.5	9.9	10.1	9.9	11.8
44005	42.7N	068.3W	718	30	1032.5	25	14	1004.2	22	16	1017.6	701	21	22	14	170	10.3	9.5	7.3	9.8	9.3	8.7	7.4	7.5	08.7
44007	43.5N	070.1W	715	30	1034.0	25	14	1002.9	22	10	1017.7	694	20	07	22	290	8.6	5.9	5.8	8.7	10.2	10.0	8.2	6.7	08.9
44008	40.5N	069.4W	711	30	1032.2	25	14	1005.6	22	14	1018.0	703	19	14	11	050	8.3	12.2	9.5	9.1	8.9	9.0	7.8	6.9	09.3
45001	48.0N	087.6W	714	30	1026.7	14	16	996.5	06	02	1013.4	708	23	11	03	200	7.2	8.6	9.0	9.8	9.4	9.3	12.0	10.4	10.0
45002	45.3N	086.3W	650	29	1027.8	24	15	1001.8	18	18	1016.1	709	24	07	01	310	8.6	10.3	9.7	10.0	10.7	13.1	11.5	12.4	11.8
45003	45.3N	082.8W	720	30	1029.7	24	15	1000.1	06	09	1015.8	715	23	06	22	270	10.2	10.1	10.9	9.4	11.4	10.7	12.2	10.8	11.1
45004	47.2N	086.5W	713	30	1027.1	14	16	995.1	06	02	1014.8	704	21	11	04	300	7.4	8.6	9.5	8.6	9.2	8.9	10.9	10.9	09.5
45005	41.7N	082.5W	719	30	1035.3	24	15	1006.1	21	03	1019.4	717	21	22	19	250	9.2	7.5	6.0	6.9	9.6	9.9	11.3	9.0	09.2
45006	47.3N	090.0W	720	30	1028.3	14	15	997.8	06	09	1014.3	709	19	06	22	240	6.3	6.6	6.1	6.5	6.6	8.7	10.7	6.3	08.0
45007	42.7N	087.1W	718	30	1031.0	24	15	1002.3	06	00	1017.6	712	24	16	05	150	10.8	10.0	6.4	7.5	9.5	10.9	12.2	13.2	10.4
45008	44.3N	082.4W	719	30	1031.7	24	16	1001.7	06	13	1016.5	708	23	16	16	130	7.4	8.9	8.0	7.7	10.2	10.5	11.1	10.4	09.9
45009	41.6N	082.0W	716	30	1035.6	24	15	1005.2	21	04	1018.7	699	24	22	22	270	7.2	7.8	6.4	6.7	9.5	10.4	11.4	9.8	09.3
46001	56.3N	148.3W	717	30	1025.4	17	23	995.2	02	04	1011.7	706	28	03	23	270	6.2	8.8	7.2	13.1	12.1	11.5	14.7	14.6	12.6
46002	42.5N	130.3W	719	30	1028.1	27	19	1008.5	01	09	1020.2	694	30	20	12	020	15.3	15.6	3.2	2.0	2.8	10.9	12.6	12.7	14.0
46003	51.9N	155.7W	720	30	1028.6	06	01	994.0	19	16	1016.3	712	28	17	02	070	12.0	13.3	19.2	13.5	13.0	14.1	13.7	13.4	13.8
46004	51.0N	136.0W	720	30	1033.5	20	20	998.5	06	01	1018.4	699	35	06	02	280	11.6	9.3	8.6	10.1	11.4	13.9	13.8	13.0	13.0
46005	46.1N	131.0W	718	30	1032.7	20	06	1010.9	18	07	1020.8	716	30	18	09	330	16.3	15.3	10.0	11.9	14.5	13.8	14.5	15.7	15.1
46006	40.7N	137.7W	720	30	1034.3	28	06	1014.9	01	13	1025.3	715	25	29	23	350	14.1	14.2	15.1	5.3	12.3	14.3	13.2	11.3	13.4
46010	46.2N	124.2W	705	30	1030.9	19	20	1002.7	18	17	1018.9	696	32	18	18	340	10.4	8.1	11.2	5.5	11.6	8.4	4.8	10.3	09.8
46011	34.9N	120.9W	717	30	1020.0	25	18	1006.3	30	11	1013.2	688	21	03	12	330	7.2	3.9	5.0	3.9	8.9	6.8	4.1	10.2	08.9
46012	37.4N	122.7W	719	30	1019.6	25	18	1004.3	30	13	1013.2	704	22	09	10	320	5.9	7.3	3.5	7.2	7.2	5.2	4.3	9.6	07.6
46013	38.2N	123.3W	719	30	1020.6	23	19	1004.8	30	11	1014.0	676	28	09	01	310	2.7	2.8	5.2	7.2	4.7	4.3	6.0	13.3	10.1
46014	39.2N	124.0W	720	30	1019.1	24	05	1003.6	30	02	1012.9	694	30	04	06	330	11.9	4.1	5.1	8.1	7.5	5.0	3.6	15.2	11.7
46016	63.3N	170.3W	235	30	1026.6	25	09	974.7	30	09	1012.3	237	30	30	12	350	12.5	13.9	10.7	10.0	12.1	10.0	8.3	11.3	11.2
46017	60.3N	172.3W	171	30	1026.0	16	12	974.4	29	15	1011.1	175	35	30	00	350	13.4	15.4	15.0	9.7	14.9	9.2	12.7	10.8	13.0
46022	40.8N	124.5W	718	30	1021.8	10	05	1003.6	30	08	1014.7	707	25	28	00	350	14.0	5.4	3.8	7.2	9.5	6.8	3.7	7.8	12.0
46023	34.3N	120.7W	718	30	1020.1	26	18	1006.6	30	11	1012.9	703	23	02	07	320	9.9	5.7	6.1	7.3	8.3	6.6	6.5	14.0	12.6
46024	32.8N	119.2W	710	30	1019.2	26	18	1006.9	05	01	1012.3	690	22	03	23	310	4.6	2.9	8.4	7.1	9.0	6.6	7.1	11.8	10.5
46025	33.6N	119.0W	712	30	1018.0	25	18	1005.9	05	01	1011.3	665	16	04	01	290	2.9	3.3	4.4	4.7	3.8	3.7	7.2	7.7	06.3
46026	37.8N	122.7W	718	30	1020.0	25	18	1004.6	30	11	1013.5	693	22	09	01	310	2.8	3.5	6.9	6.4	6.8	5.8	5.7	9.2	06.9
46027	41.8N	124.4W	713	30	1022.6	10	17	1002.8	30	01	1015.3	709	37	05	00	350	17.4	4.5	4.1	5.1	5.8	4.1	4.7	12.1	13.0
CSBF1	29.7N	085.4W	716	30	1026.0	24	13	1009.7	01	22	1018.2	713	27	13	10	220	3.8	4.2	5.5	4.7	8.4	9.9	7.6	4.8	05.7
DPLN6	42.6N	079.5W	309	15	1022.0	14	02	1002.6	21	08	1014.9	715	25	07	12	270	5.4	8.3	4.3	6.0	5.0	10.7	12.0	7.9	07.8
GLLN6	43.5N	076.3W	268	12	1032.8	24	15	1002.4	21	14	1021.4	266	27	22	19	240	2.2	5.2	4.9	8.4	13.9	14.3	13.7	10.6	11.5
SRIO1	0.0N	000.0W	339	18	1029.1	29	13	1004.7	21	01	1015.9	036	09	30	17	060	4.8	5.8	3.5	3.0					04.4

SEPTEMBER 1983			WAVE HEIGHTS (METERS)					FREQUENCY OF WAVE HEIGHTS (%)							
BUOY	LAT	LONG	OBS	MAX	DY	HR	MEAN	<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41001	34.9N	072.9W	715	7.5	29	05	1.8	15.6	46.5	19.5	9.3	6.4	2.3		
41002	32.3N	075.3W	415	6.0	29	15	2.5	1.2	30.3	32.0	14.9	21.2	0.2		
41006	29.3N	077.3W	716	4.5	25	19	1.6	23.7	37.1	19.4	15.6	4.0			
42001	25.9N	089.7W	692	3.0	25	03	1.1	34.2	46.2	18.3	1.1				
42002	26.0N	093.5W	683	3.0	25	09	1.2	28.2	45.9	25.6	0.1				
42003	26.0N	085.9W	621	3.0	25	07	1.1	25.7	58.9	14.0	1.2				
42007	30.1N	088.9W	533	1.5	06	20	0.6	67.7	32.2						
44003	40.8N	068.5W	714	3.5	22	19	1.2	14.5	66.6	17.3	1.4				
44004	38.5N	070.7W	713	5.5	29	22	1.5	17.6	53.8	17.5	5.7	5.1			
44005	42.7N	068.3W	716	3.0	17	17	1.0	25.4	65.2	8.7	0.5				
44007	43.5N	070.1W	641	2.0	17	16	0.7	65.0	33.2	1.7					
44008	40.5N	069.4W	700	3.0	22	14	1.1	25.1	58.8	14.7	1.2				
45001	48.0N	087.6W	691	3.5	11	10	1.2	24.0	54.5	18.9	2.4				
45002	45.3N	086.3W	673	3.5	25	00	1.2	27.3	55.7	14.2	2.6				
45003	45.3N	082.8W	651	3.0	16	16	1.0	37.4	52.6	9.0	0.7				
45005	41.7N	082.5W	606	2.0	22	22	0.8	44.7	55.1	0.1					
45006	47.3N	090.0W	442	1.5	18	23	0.6	73.9	26.0						
45007	42.7N	087.1W	660	3.0	16	06	1.0	39.6	47.2	12.4	0.6				
45008	44.3N	082.4W	662	2.5	16	13	1.0	34.1	55.7	10.1					
45009	41.6N	082.0W	464	2.0	21	09	0.7	71.7	25.8	2.3					
46001	56.3N	148.3W	711	6.5	04	02	2.6	4.6	24.0	25.7	30.8	13.3	1.4		
46002	42.5N	130.3W	713	4.5	20	12	2.0	0.4	42.6	37.7	14.8	4.3			
46003	51.9N	155.7W	718	8.5	30	07	2.4		22.9	44.5	24.2	6.9	1.2		
46004	51.0N	136.0W	719	7.5	06	08	2.3		29.3	43.6	21.0	4.5	1.3		
46005	46.1N	131.0W	718	5.0	18	16	1.8	1.3	48.6	38.4	10.0	1.5			
46006	40.7N	137.7W	717	3.5	20	22	1.6	0.5	60.8	33.6	5.0				
46010	46.2N	124.2W	687	4.0	27	12	1.5	4.5	65.3	24.1	5.8	0.2			
46011	34.9N	120.9W	713	3.0	09	11	1.4	5.4	67.6	24.9	1.9				
46012	37.4N	122.7W	717	3.5	09	02	1.5	6.5	59.4	31.1	2.9				
46013	38.2N	123.3W	715	4.0	28	13	1.8	5.8	39.7	41.1	13.0	0.2			
46014	39.2N	124.0W	719	4.0	08	05	2.0	5.7	35.4	37.9	18.4	2.3			
46022	40.8N	124.5W	715	8.0	28	06	2.1	4.0	33.2	40.4	15.8	6.4			
46023	34.3N	120.7W	640	4.0	29	13	1.7	0.7	60.4	29.8	8.7	0.1			
46024	32.8N	119.2W	703	2.5	03	22	1.3	0.1	83.0	16.7					
46025	33.6N	119.0W	699	2.0	04	03	0.9	34.7	64.5	0.7					
46026	37.8N	122.7W	713	2.5	08	23	1.1	18.6	70.6	10.6					
GLLN6	43.5N	076.3W	123	0.0	00	00	0.0								30.0

SEPTEMBER 1983			TOTAL FREQUENCY OF WIND SPEEDS (%)							TOTAL FREQUENCY OF WIND DIRECTIONS (%)							
BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W		7.1	30.7	42.9	17.2	2.1		17.5	15.1	7.3	7.2	10.9	14.4	19.2	8.5
41002	32.3N	075.3W		10.5	43.6	43.1	2.7			8.5	27.6	6.5	3.1	7.6	25.2	18.0	3.5
41006	29.3N	077.3W		15.3	40.0	39.4	5.4			14.3	18.0	10.1	9.8	15.6	18.6	9.4	4.2
42001	25.9N	089.7W		4.1	21.6	64.9	9.4			4.3	36.0	27.9	17.8	6.6	2.1	1.3	4.0
42002	26.0N	093.5W		3.4	28.9	63.7	3.9			5.2	14.7	30.7	28.9	14.2	2.6	1.4	2.3
42003	26.0N	085.9W	0.6	8.2	40.8	48.7	2.3			5.3	30.9	23.3	15.9	9.7	7.2	4.8	3.0
42007	30.1N	088.9W		10.4	46.5	42.1	1.0			8.7	23.2	21.6	14.7	18.2	5.9	4.4	3.3
42008	28.7N	095.3W	0.1	2.4	27.6	64.6	5.2	0.1		8.0	15.8	29.2	23.8	13.1	4.4	2.2	3.6
42011	29.6N	093.5W	0.4	4.7	41.4	50.4	3.5			6.8	17.6	23.6	20.2	20.3	4.7	4.5	2.3
42012	29.8N	087.1W		8.0	42.3	47.0	2.7			9.6	21.1	22.8	13.0	13.6	7.6	7.7	4.6
44003	40.8N	068.5W		11.2	63.8	24.9	0.1			13.9	16.1	7.4	3.8	11.6	30.2	9.5	7.6
44004	38.5N	070.7W		3.1	38.1	53.5	5.3			12.6	19.7	6.3	5.1	7.4	22.1	16.6	10.2
44005	42.7N	068.3W		9.0	59.8	31.2				12.2	5.2	3.1	5.2	17.7	28.4	16.2	12.1
44007	43.5N	070.1W		10.1	53.3	36.6				14.5	3.7	2.7	5.7	15.7	33.0	14.8	9.8
44008	40.5N	069.4W		8.4	55.2	36.4				15.6	19.1	8.7	3.5	13.1	25.2	9.4	5.4
45001	48.0N	087.6W		4.8	52.1	42.8	0.3			6.1	7.3	5.9	9.1	13.0	20.0	24.6	14.0
45002	45.3N	086.3W		2.7	34.3	62.5	0.6			9.0	1.9	2.5	4.7	13.0	42.4	12.8	13.8
45003	45.3N	082.8W		5.5	40.4	53.4	0.7			2.3	2.3	1.7	7.2	26.3	20.2	19.4	20.6
45004	47.2N	086.5W		7.2	52.1	40.6				8.3	6.3	5.4	8.1	15.6	20.8	19.1	16.3
45005	41.7N	082.5W		9.6	51.9	38.5				8.5	10.8	8.3	6.4	19.0	23.1	16.9	6.9
45006	47.3N	090.0W		10.3	66.3	23.4				2.9	12.8	9.1	9.7	12.8	24.4	22.2	6.2
45007	42.7N	087.1W		5.2	47.2	46.6	1.0			6.8	4.2	3.1	12.1	23.5	25.0	10.1	15.2
45008	44.3N	082.4W		8.6	46.3	44.6	0.4			8.4	1.9	3.1	8.7	22.1	24.0	19.3	12.5
45009	41.6N	082.0W		9.6	52.2	37.6	0.6			6.9	12.1	5.7	5.1	27.6	23.5	13.1	6.1
46001	56.3N	148.3W		7.4	30.2	55.4	7.1			5.2	3.4	3.1	8.7	8.7	20.7	26.0	22.0
46002	42.5N	130.3W		4.0	22.6	66.4	6.9			51.2	8.2	0.5	0.6	0.4	4.1	9.0	26.1
46003	51.9N	155.7W		2.1	26.1	63.6	8.1			12.5	2.1	5.8	4.7	11.1	21.3	31.7	10.8
46004	51.0N	136.0W		3.7	31.5	58.7	6.0	0.1		6.0	3.4	2.5	1.9	9.4	20.1	25.3	31.3
46005	46.1N	131.0W		0.7	18.7	71.9	8.7			21.4	6.3	0.3	1.1	3.9	13.3	24.8	28.9
46006	40.7N	137.7W		2.5	26.0	67.6	3.9			39.3	23.1	2.4	2.3	4.4	3.2	12.6	12.7
46010	46.2N	124.2W		9.9	44.5	44.3	1.3			23.5	5.3	8.4	1.9	13.4	11.8	5.1	29.6
46011	34.9N	120.9W		9.7	57.6	32.7				16.2	2.3	0.1	2.6	6.3	3.1	4.8	64.8
46012	37.4N	122.7W		17.6	57.8	24.4	0.1			4.3	0.8	1.8	6.4	12.0	12.6	12.4	49.7
46013	38.2N	123.3W		15.2	40.4	39.8	4.6			2.2	1.1	5.0	9.6	6.5	4.0	13.1	58.6
46014	39.2N	124.0W		12.5	39.0	36.3	12.1			30.6	4.3	3.7	4.7	9.2	2.1	2.3	41.1
46016	63.3N	170.3W		6.8	46.4	40.5	6.3			10.4	20.5	15.3	6.3	6.9	14.1	17.3	9.8
46017	60.3N	172.3W		4.6	34.9	55.4	4.0	1.1		18.3	19.1	11.6	6.4	5.1	11.3	19.9	8.3
46022	40.8N	124.5W		7.2	33.0	55.3	4.5			72.2	5.1	2.8	3.7	5.9	5.1	1.9	3.3
46023	34.3N	120.7W		5.4	29.3	64.3	1.0			7.9	0.5	2.1	4.1	3.4	2.4	3.2	76.4
46024	32.8N	119.2W		9.6	39.1	50.9	0.4			2.9	0.7	3.0	2.4	3.3	2.2	14.1	71.4
46025	33.6N	119.0W		29.3	54.9	15.8				3.6	2.1	4.2	6.3	8.5	7.7	40.3	27.3
46026	37.8N	122.7W		20.4	52.0	17.9	0.1			2.0	3.6	3.8	3.1	13.4	19.0	24.6	32.5
46027	41.8N	124.4W	4.8	10.2	36.0	29.9	23.0	1.0		65.9	5.1	2.6	9.0	6.2	1.1	0.4	9.7
CSBF1	29.7N	085.4W	4.3	28.9	61.2	8.7	1.3			12.7	31.5	10.6	10.9	15.3	8.1	6.9	4.1
DBLN6	42.6N	079.5W	2.5	13.4	63.6	71.7	1.3			3.8	5.7	5.2	18.5	26.8	19.9	12.8	7.3
GLLN6	43.5N	076.3W	5.3	13.5	30.1	50.8	5.3			3.6	6.1	8.6	4.2	26.4	16.3	20.9	13.5
SBIO1	0.0N	000.0W		30.6	69.4					2.8	59.0	35.4	2.8				

SEPTEMBER 1983			% FREQUENCY OF WIND SPEEDS (<4 KTS)								% FREQUENCY OF WIND SPEEDS (4-10 KTS)								% FREQUENCY OF WIND SPEEDS (11-21 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W	0.4	1.1	1.1	1.0	0.3	0.8	1.6	0.8	4.1	1.5	1.3	4.3	3.9	2.4	8.5	4.7	8.5	4.4	3.8	1.7	5.1	8.2	8.5	2.6
41002	32.3N	075.3W	0.5	1.4	3.0	1.3	1.1	0.8	1.7	0.8	3.3	5.7	2.7	1.4	4.7	10.5	12.9	2.3	3.8	19.1	0.9	0.4	1.8	13.4	3.3	0.4
41006	29.3N	077.3W	4.0	1.8	1.1	2.0	1.4	1.1	1.3	2.6	3.2	2.2	7.4	7.2	7.4	7.0	4.5	1.1	6.5	9.9	1.2	0.7	6.6	10.3	3.6	0.5
42001	25.9N	089.7W	0.7	0.9		0.4	0.4	0.4	0.2	1.1	0.6	1.4	6.3	5.2	3.4	1.4	0.9	2.1	2.7	27.4	19.1	12.1	2.4	0.3	0.3	0.7
42002	26.0N	093.5W	0.7	0.6	0.7	0.3	0.6	0.3	0.1		2.6	4.1	5.2	8.4	4.8	1.8	0.9	1.4	1.6	8.3	24.0	19.2	8.8	0.5	0.4	0.9
42003	26.0N	085.9W	0.3	1.1	1.9	1.6	1.1	0.8	0.7	0.8	1.7	7.7	8.4	8.6	6.1	3.4	3.4	1.6	3.3	21.4	11.9	5.6	2.4	2.8	0.8	0.4
42007	30.1N	088.9W	1.0	1.1	2.0	2.5	2.4	0.7	0.6	0.1	3.5	9.5	10.0	8.6	9.0	3.4	1.4	1.1	4.0	12.1	9.6	3.5	6.6	1.9	2.3	2.1
42008	28.7N	095.3W	0.2	0.2	0.7	0.4		0.2	0.2	0.5	2.7	3.3	5.7	6.1	3.6	2.5	1.6	2.2	2.3	12.1	22.7	16.0	8.8	1.6	0.4	0.7
42011	29.6N	093.5W	0.5	0.7	0.7	0.9	1.5		0.3	0.1	2.9	7.8	9.1	7.9	6.9	2.4	2.7	1.5	2.3	8.7	13.7	11.1	10.5	2.0	1.5	0.6
42012	29.8N	087.1W	0.8	1.1	0.5	1.5	0.8	1.4	1.1	0.9	3.9	7.0	7.3	7.6	7.1	4.1	3.3	1.9	3.5	12.2	15.0	3.8	5.6	2.1	3.2	1.6
44003	40.8N	068.5W	0.9	1.1	0.8	0.5	1.6	3.6	1.8	0.9	6.9	6.4	4.2	1.9	8.0	23.1	7.4	5.9	5.9	8.5	2.4	1.3	2.1	3.5	0.3	0.8
44004	38.5N	070.7W	0.1	0.1		0.1	0.1	1.4	1.1	<.05	4.4	2.8	2.1	2.1	3.2	10.8	7.1	5.6	7.4	13.1	3.8	2.9	3.9	9.6	8.4	4.6
44005	42.7N	068.3W	0.5	0.6	0.4	1.2	1.8	1.6	1.3	1.5	6.1	2.6	2.0	1.7	8.5	18.1	12.4	6.3	5.5	2.0	0.6	2.3	7.5	8.6	2.4	2.3
44007	43.5N	070.1W	2.1	0.8	1.2	1.2	1.4	0.6	0.8	2.0	7.2	2.6	1.0	2.0	7.6	16.4	10.3	6.3	5.2	0.4	0.6	2.4	6.8	16.1	3.6	1.5
44008	40.5N	069.4W	1.1	1.1	1.4	0.6	0.9	1.0	1.5	0.7	11.6	5.5	2.9	1.4	8.1	16.3	5.2	4.3	2.9	12.4	4.5	1.5	4.1	7.9	2.7	0.5
45001	48.0N	087.6W	0.8	0.2		1.0	0.6	0.8	0.6	0.8	4.6	4.7	3.8	4.3	8.2	11.8	9.3	5.4	0.7	2.4	2.1	3.8	4.2	7.5	14.4	7.8
45002	45.3N	086.3W	0.6	0.3	0.2	0.2	0.4	0.5	0.4	0.2	6.3	0.6	1.1	2.3	7.0	8.8	4.3	3.8	2.0	1.0	1.2	2.2	5.6	32.7	8.1	9.7
45003	45.3N	082.8W	0.1	0.4	0.1	0.6	1.0	1.3	0.9	1.0	0.9	0.5	0.8	4.1	8.9	9.3	6.2	9.8	1.3	1.4	0.5	2.2	16.4	9.7	12.2	9.8
45004	47.2N	086.5W	0.3	0.3	0.2	0.5	0.9	1.4	2.4	1.3	6.8	4.4	3.2	5.5	9.4	12.8	5.3	4.8	1.2	1.6	2.0	2.1	5.4	6.6	11.5	10.3
45005	41.7N	082.5W	0.3	1.5	2.2	0.8	1.8	1.4	1.3	0.4	5.2	7.1	6.1	4.4	8.8	9.9	6.0	4.5	3.1	2.2	0.1	1.3	8.4	11.8	9.6	2.0
45006	47.3N	090.0W	0.2	1.4	1.8	1.1	1.6	1.9	1.1	1.3	2.7	10.8	5.9	8.2	10.4	15.1	8.6	4.7		0.7	1.4	0.4	0.9	7.4	12.5	0.2
45007	42.7N	087.1W	0.3	0.7	0.5	2.3	0.7	0.6	0.4	0.1	2.6	1.8	2.4	8.1	14.6	11.0	2.5	4.2	3.9	2.2	0.1	1.1	8.0	13.3	7.2	10.8
45008	44.3N	082.4W	1.0	0.1	0.5	1.9	1.4	0.9	1.4	1.5	6.9	1.2	1.9	4.8	9.3	10.5	7.0	4.7	0.5	0.7	0.6	1.5	11.4	12.6	10.9	6.4
45009	41.6N	082.0W	0.8	1.5	1.3	1.5	2.4	0.8	0.6	0.8	4.9	7.4	4.1	2.6	12.6	11.9	6.2	2.6	1.2	3.1	0.2	1.0	12.7	10.8	5.8	2.8
46001	56.3N	148.3W	1.5	0.3	0.7	0.7	1.0	1.4	0.7	1.1	3.2	1.8	4.0	2.5	2.3	7.0	5.0	4.3	0.5	1.5	0.4	4.3	4.9	11.7	16.8	15.4
46002	42.5N	130.3W	1.2	0.7	0.3	0.4	0.3	0.3	0.6	0.4	8.4	2.8	0.2	0.1	0.1	1.5	2.3	7.1	38.1	1.5				2.3	6.1	18.3
46003	51.9N	155.7W	0.1	0.2	0.3	0.3	0.5	0.1	0.7		5.2	0.7	0.8	1.2	4.1	5.5	5.4	3.2	6.9	0.7	1.2	2.6	5.4	14.1	25.5	7.3
46004	51.0N	136.0W	0.6	0.6	0.3		0.2	0.2	1.1	0.6	1.9	1.3	1.3	0.3	5.0	4.5	6.8	10.5	3.5	1.5	1.0	0.7	4.0	14.1	15.2	18.6
46005	46.1N	131.0W	0.3	0.2				0.1		<.05	3.2	0.6	0.3	0.3	1.2	4.7	6.1	2.9	14.2	5.4		0.8	2.2	7.2	17.2	24.9
46006	40.7N	137.7W	0.6	0.3	0.1	0.3	0.3	0.2		0.6	7.7	5.4	0.4	2.0	1.4	0.6	4.3	4.2	27.6	17.1	1.9		2.6	2.3	8.3	7.8
46010	46.2N	124.2W	1.4	0.8	1.4	0.5	1.2	1.3	1.5	1.9	10.2	3.2	1.5	1.4	5.2	6.6	3.6	12.7	11.6	2.2	5.5		6.1	3.8		15.0
46011	34.9N	120.9W	1.9	0.8		1.5	0.5	0.8	1.7	2.6	11.4	1.5	0.1	0.9	3.3	2.1	3.1	35.2	2.9			0.2	2.4	0.2		27.0
46012	37.4N	122.7W	0.9	0.2	1.0	0.7	2.8	4.0	5.1	2.8	3.0	0.4	0.9	4.1	6.0	8.1	7.2	28.1	0.4	0.1		1.5	3.2	0.4	0.1	18.6
46013	38.2N	123.3W	1.7	0.7	1.4	1.7	2.5	1.6	3.4	2.3	0.5	0.4	3.3	6.3	4.0	2.4	8.2	15.3		<.05	0.2	1.6	0.1		1.5	36.4
46014	39.2N	124.0W	2.0	1.7	1.4	1.6	1.3	0.9	1.1	2.5	11.7	2.6	2.3	3.3	6.6	1.2	1.2	10.2	15.2			1.8	1.3			18.0
46016	63.3N	170.3W	0.7	0.4	0.7	0.1	0.4	1.1	2.3	0.9	5.2	5.7	8.1	3.8	2.7	7.5	9.6	3.8	2.8	12.3	5.5	2.3	3.4	5.6	5.1	3.5
46017	60.3N	172.3W	0.6	0.6	0.6			1.4	1.3	0.1	6.4	5.1	1.9	3.9	1.1	5.3	5.6	5.6	9.3	12.7	9.1	2.6	4.0	4.4	10.9	2.4
46022	40.8N	124.5W	1.4	1.3	1.0	0.4	0.4	0.7	1.1	1.0	16.0	3.4	1.8	2.8	3.4	3.5	0.8	1.3	50.4	0.3		0.6	2.1	0.8		1.0
46023	34.3N	120.7W	0.4	0.1	0.6	1.3	0.5	0.4	0.6	1.5	4.8	0.4	1.1	1.2	2.1	1.8	2.1	15.7	2.7		0.4	1.6	0.8	0.2	0.4	58.2
46024	32.8N	119.2W	1.2	0.5	0.5	0.9	1.1	0.5	2.5	2.2	1.5	0.2	1.3	0.5	0.4	1.0	6.8	25.4	0.2		1.2	0.9	1.8	0.6	2.8	43.4
46025	33.6N	119.0W	2.6	1.3	2.1	2.7	5.5	4.1	7.0	4.1	1.1	0.8	1.7	3.3	2.4	3.4	26.1	16.2			0.5	0.3	0.6	0.2	7.3	7.0
46026	37.8N	122.7W	1.7	1.0	1.5	0.8	3.0	4.7	4.4	3.7	0.3	0.5	0.9	2.0	7.7	13.6	16.9	17.2		<.05	1.4	0.3	2.7	0.7	1.4	11.5
46027	41.8N	124.4W	4.2	0.7	0.8	1.9	1.2	0.7		0.7	13.6	4.3	1.8	6.5	4.9	0.5	0.4	3.9	25.2	0.1		0.6				3.9
CSBF1	29.7N	085.4W	5.7	11.6	2.8	3.7	1.6	1.4	0.7	1.4	6.9	19.8	7.4	6.8	10.1	3.7	3.8	2.6		<.05	0.4	0.4	3.2	2.1	2.4	0.2
DBLN6	42.6N	079.5W	0.7	0.9	1.6	3.0	3.5	1.4	0.7	1.7	3.0	2.7	3.6	14.1	22.8	9.1	5.1	3.3	0.1	2.1		1.3	0.6	9.1	6.4	2.0
GLLN6	43.5N	076.3W	2.9	2.3	2.3	1.5	1.5		2.5	0.5	0.7	3.8	6.4	1.3	4.7	3.8	2.2	7.3				1.3	18.6	11.4	14.1	5.4
SBIO1	0.0N	000.0W		13.9	13.9	2.8					2.8	45.1	21.5													

SEPTEMBER 1983			% FREQUENCY OF WIND SPEEDS (22- 33 KTS)								% FREQUENCY OF WIND SPEEDS (34-47 KTS)								% FREQUENCY OF WIND SPEEDS (>47 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W	3.2	7.7	1.1	0.2	1.6	7.0	0.5	0.5	1.2	0.8						<.05								
41002	32.3N	075.3W	0.9	1.3					0.4	0.1																
41006	29.3N	077.3W	0.5	4.0	0.3		0.3	0.2																		
42001	25.9N	089.7W		6.4	2.5	0.2	0.4																			
42002	26.0N	093.5W	0.3	1.7	0.8	1.1	0.1																			
42003	26.0N	085.9W		0.7	1.1	0.1		0.3		0.1																
42007	30.1N	088.9W	0.3	0.4			0.1		0.1																	
42008	28.7N	095.3W	2.6	0.2		1.2	0.7	0.1		0.2				0.1												
42011	29.6N	093.5W	1.1	0.3	0.1	0.3	1.3	0.2		0.1																
42012	29.8N	087.1W	1.4	0.8		0.7	0.1	<.05	0.1	0.1																
44003	40.8N	068.5W	0.1																							
44004	38.5N	070.7W	0.7	3.7	0.4		0.3	0.3																		
44005	42.7N	068.3W																								
44007	43.5N	070.1W																								
44008	40.5N	069.4W																								
45001	48.0N	087.6W							0.3																	
45002	45.3N	086.3W						0.4		0.1																
45003	45.3N	082.8W			0.3	0.7			0.1																	
45004	47.2N	086.5W																								
45005	41.7N	082.5W																								
45006	47.3N	090.0W																								
45007	42.7N	087.1W				0.6	0.2	0.1																		
45008	44.3N	082.4W				0.4																				
45009	41.6N	082.0W							0.6																	
46001	56.3N	148.3W				1.1	0.6	0.6	3.5	1.2																
46002	42.5N	130.3W	3.5	3.2						0.3																
46003	51.9N	155.7W	0.3	0.5	3.5	0.7	1.1	1.6	0.1	0.3																
46004	51.0N	136.0W				0.9	0.1	1.4	2.0	1.6							0.1									
46005	46.1N	131.0W	3.7	0.1			0.6	1.7	1.5	1.1																
46006	40.7N	137.7W	3.3	0.3			0.1	0.2																		
46010	46.2N	124.2W	0.3				1.0	<.05		<.05																
46011	34.9N	120.9W																								
46012	37.4N	122.7W								0.1																
46013	38.2N	123.3W								4.6																
46014	39.2N	124.0W	1.7							10.4																
46016	63.3N	170.3W	1.7	2.0	0.9	0.1	0.3		0.3	0.9																
46017	60.3N	172.3W	1.0	0.6				0.1	2.1	0.1	1.0	0.1														
46022	40.8N	124.5W	4.4				0.1	<.05																		
46023	34.3N	120.7W								1.0																
46024	32.8N	119.2W								0.4																
46025	33.6N	119.0W																								
46026	37.8N	122.7W								0.1																
46027	41.8N	124.4W	21.9							1.1	1.0															
CSBF1	29.7N	085.4W					0.4	0.9																		
DBLN6	42.6N	079.5W						0.3	0.7	0.3																
GLLN6	43.5N	076.3W				0.1	1.6	1.1	2.1	0.4																
SBIO1	0.0N	000.0W																								

NODC Environmental Information Summary No. 82-2

COASTAL RECREATION BROCHURES

Basic information about winds, waves, and air and water temperatures can make fishing, boating, sailing, swimming, and sunbathing safer and more enjoyable. As a service to the marine sports enthusiast and the vacation traveler, the National Oceanographic Data Center (NODC) and the Sea Grant Programs in various states are jointly producing a series of coastal recreation brochures that present marine environmental data in a useful format. In addition to easy-to-read tables that summarize data on marine climate throughout the year, these handy brochures contain information on sportfish species, historical sites, tourist attractions, weather hazards, and safety precautions. Each brochure is tailored to its area and designed to help both local residents and visitors make the most of their time at the seashore.

Help in planning seashore activities is also provided by NODC's Water Temperature Guide to Atlantic Beaches and Water Temperature Guide to the Pacific Coast. These concise summaries give two-week (April through October) or monthly (November through March) average water temperatures for 35 east coast and 41 west coast locations.

Single copies are free; bulk rate on request. To order, please check the brochures you want, fill in your name and mailing address.

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☐ Eastern Long Island

☐ Water Temperature Guide to Atlantic Beaches

☐ Water Temperature Guide to the Pacific Coast

NAME ____________________

STREET ____________________

CITY ____________________ STATE __________ ZIP __________

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Environmental Satellite, Data, and Information Service
National Oceanographic Data Center
Washington D.C. 20235

COASTAL RECREATION BROCHURES

Examples of the type of information contained in the Coastal Recreation Brochures from the "Recreation and Climate Guide for Coastal Mississippi."

FISHING WEATHER

	COASTAL					OFFSHORE					
	Average Number of Days				Temp. (F°)	% of Days				Temp. (F°)	Average
	Sun +	Rain ‡	Thunder	Fog ǂ	Max/min°	Sun +	Rain ‡	Thunder	Fog ǂ	Max/min°	sea temp.
January	14	8	2	8	60/45	33	4	*	5	67/50	64
February	15	8	2	4	64/48	37	8	1	1	66/51	63
March	16	7	5	5	68/53	42	6	1	5	68/56	65
April	19	7	4	3	76/61	41	5	1	1	74/63	70
May	22	7	6	*	83/68	41	5	2	*	82/72	76
June	22	8	10	*	88/74	34	5	4	*	84/78	82
July	20	10	15	*	90/75	25	9	4	*	87/80	84
August	22	9	14	1	90/75	29	5	4	*	86/80	85
September	21	9	7	1	86/71	35	7	2	*	83/76	84
October	23	5	2	2	79/61	50	4	1	*	79/69	79
November	19	5	2	4	69/51	48	3	*	*	73/58	73
December	16	9	2	6	62/45	38	7	*	1	68/52	69

*less than 0.5%
+sky less than 3/8 covered
‡days with 0.1 in or more
ǂvisibility 1/2 mile or less
°max/min temp offshore are 75th and 25th percentiles

BEACH DAYS

	Biloxi	Mobile	New Orleans	Pensacola
January	0	0	*	0
February	0	*	1	0
March	*	2	3	*
April	7	11	12	4
May	23	23	23	20
June	29	27	28	27
July	29	29	29	29
August	28	29	29	28
September	24	24	25	25
October	12	14	14	14
November	1	2	3	2
December	0	*	*	0

*less than 0.5 days

A day is considered a good beach day if (using the 10 a.m., 1 p.m., and 4 p.m. observations):

- temperatures reach 80°F. or more at least once.
- rain occurs no more than once.
- visibility is above 2½ miles at least once.
- cloudy skies (9/10 or overcast with ceilings of 20,000 feet or less) do not occur more than twice.

MARINERS WEATHER LOG REPRINTS AVAILABLE

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5. Eastern North Pacific tropical cyclone summaries, 1956-82
6. Principal tracks of centers of cyclones at sea-level, North Atlantic, 1956-82
7. Principal tracks of centers of cyclones at sea-level, Noth Pacific, 1956-82
8. The Great Lakes navigation season, 1964-82

ADDRESSES OF NATIONAL WEATHER SERVICE PORT METEOROLOGICAL OFFICES

NOAA National Weather Service Port Meteorological Offices have personnel who visit ships in port to check and calibrate barometers and other meteorological instruments. In addition, port meteorologists assist masters and mates with problems regarding weather observations, preparation of weather maps, and forecasts. Meteorological manuals, forms, and some instruments are also provided.

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